

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No.: 06-HMAR-MA7-00182  
Habitat File No.: 06-W7-182

Receive Date: 2006/08/11

1

Activity: Meeting  
To:  
From:  
Action ID No.:  
Action Date:  
Document Date:

August 30, 2006

Description: Preliminary meeting of proponent and regulators to discuss the development proposal and regulatory requirements. Official meeting notes received by email on October 13, 2006.

Action: Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

5

Action ID No.:

Correspondence - Do not go to Macro Access Screen

October 20, 2006

Activity:

To

From:

Action Date:

Document Date:

Description:

Sent email to JWEL outlining the initial information that DFO would like to see on the proposal in relation to fish and fish habitat.

Action:

Request for additional Information

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

8

November 10, 2006

Telephone Conversation

Action ID No.:

Action Date:

Document Date:

Activity:

To:

From:

Description:

Received a call from Jim Warner at Martec. He would like to get our input on the use of Rhodamine WT in the Shubenacadie River as part of the brine dispersion study. He will send me the MSDS.

Phone: [redacted] ext [redacted]

Information Received

Action:

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:



Fisheries & Oceans  
Pêches et Océans

Warning: Information in PATH may be private and/or sensitive and should not be shared without appropriate consultation and/or permission. Refer to the Data and System Security section of the PATH Helpfiles for details

Habitat Management

000003

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

2

November 14, 2006

Action ID No.:  
Action Date:  
Document Date:

Correspondence - Do not go to Macro Access Screen

Activity:  
To:  
From:

Description: Received an email from Martec requesting to use Rhodamine WT in the Shubenacadie River as part of their work in dispersion modelling of the brine discharge.

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

3

Action ID No.:

Correspondence - Do not go to Macro Access Screen

December 06, 2006

Activity:

To

From:

Action Date:

Document Date:

Description:

Responded by email to Martec with Science advice regarding the use of Rhodamine WT. In brief, it was recommended that further study be conducted on Rhodamine WT or they look into the use of an alternative.

Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

4  
December 20, 2006

Action ID No.:  
Action Date:  
Document Date:

Correspondence - Do not go to Macro Access Screen

Official advice received from Science on Rhodamine WT, signed off on December 20, 2006.

Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

7  
January 24, 2007

Action ID No.:  
Action Date:  
Document Date:

Meeting

Activity:  
To  
From:

Description: Meeting held between DFO, proponent and JWEL.

Action: Information Provided

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

6

January 24, 2007

Activity: Correspondence - Do not go to Macro Access Screen  
To: Action ID No.:  
From: Action Date: Document Date:

Description: Discussion paper prepared to respond to DFO's request for information received in preparation for the meeting.

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

9

Activity: Note to File

February 13, 2007

To:

From:

Action ID No.:

Action Date:

Document Date:

Description:

Follow up to the meeting - Advised [REDACTED] JWEL that the Environment Canada contact for the Alton Gas Project file would be André Gauthier (426-1855). I told her that I would like to attend any meetings that they have with EC so that I would be aware of the information that EC is providing to them.

Action:

Information Provided

s.19(1)

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

10

March 08, 2007

Action ID No.:

Action Date:

Document Date:

Meeting

Activity:

To

From:

Description:

**Attendees:** Landis Energy Corporation - David Birkett, John Hilland; JWEL -  
EC - André Gauthier; DFO-Melanie MacLean

**Meeting Notes:**

Meeting held to get EC's expertise in regards to Section 36 issues and to provide update on the proposal. Updated plans were provided.

A diffuser structure won't work in this situation. They don't want any discharge plume. They want to dilute the brine to a salinity level that is the same as the river and then discharge it into the river. The water height varies up to 3 or 4 meters at this location because of the tides. It is very dynamic and salinity and temperature change with each tidal cycle. The average tidal cycle is 3 million cubic meters of water moving up the river and 4 million cubic meters of water moving down the river. Martec is doing assessment work on flows and salinity in the river.

The proposal as shown in the draft plan involves allowing the water to flow freely into a pond constructed just back of the river bank. The water level in the pond will go up and down with the tides. Brine will be released into the pond continuously except for approximately 4 hours when the water level in the pond is low. At that time, the brine will be released into a holding pond.

A geochemical analysis showed that the salt is mainly NaCl. It is quite pure. There may be tiny rock fragments that may need to be separated out of the brine.

They are still investigating ways to minimize impacts on fish species in the river. They may have to stop withdrawing water for the brining operation when the striped bass are spawning. They can shut down for a few weeks during the year and still keep the operation economically feasible. They will be gathering more data on fish this summer.

The salinity will increase as the brining operation proceeds. It will take 60 weeks for the brine to reach 100% salinity (i.e., 260 ppt). In the early stages of brining, the plan is to dilute the brine 10:1.

They expect to have a draft report prepared in relation to the provincial environmental impact assessment by April

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

15, 2007. They will continue to work with EC and DFO.

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Note to File  
To: 11  
From: March 25, 2007  
Description: File placed on hold awaiting additional information from the proponent.  
Action: No Change/No Action Required for this Activity  
Effective Date: Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:  
Time Spent (Hrs): 0.00  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

12

Activity: Correspondence - Do not go to Macro Access Screen  
To: Margueratt, Vanessa  
From: April 25, 2007  
Document Date: April 16, 2007

Description: Draft Environmental Assessment received from NSDEL. Comments requested by May 4/07. Entered and forwarded to assessor.

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

13

Action ID No.:

Activity:

Correspondence - Do not go to Macro Access Screen

April 17, 2007

To

Action Date:

From:

Document Date:

April 16, 2007

Description:

See Action ID #12 - Draft Provincial Registration Document (copy to Joy Dube) received in HPSD on April 17, 2007. Copy received by Melanie on April 18, 2007.

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

15

Action ID No.:  
Action Date:  
Document Date:

April 24, 2007

Meeting

Activity:

To

From:

Description:

Peter Amiro attended a meeting organized by Jacques Whitford to discuss Atlantic salmon. Meeting notes to follow.

Action:

Waiting/Pending Action by others

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

14  
April 26, 2007

Action ID No.:  
Action Date:  
Document Date:

Meeting

Activity:

To:  
From:

Description:

Met with Tana Worcester. She will start the review of the draft registration document (gave her one hard copy and access to the electronic copy to place on SACOPA) and I will follow up with the request for advice ASAP. I will finalize the request based on Tana's comments, then I will forward it to Arran to see if she has any suggestions for additions in relation to species at risk. After that I just need to get Branch approvals. Carol Ann will forward the request on by email to Mike Sinclair.

Action: Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:

0.00

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

16

Activity:

Action ID No.:

Correspondence - Do not go to Macro Access Screen

May 16, 2007

To

Bradford, Rod

Action Date:

May 16, 2007

From:

s.19(1)

Description:

I was copied on a striped bass monitoring proposal sent to Rod for review and comment.

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

17

Action ID No.:  
Action Date:  
Document Date:

Telephone Conversation

Fleming, Melanie

s.19(1)

Told him that Rod had reviewed the striped bass monitoring proposal and is proposing an alternate monitoring plan. I will be providing this information to [redacted] sometime in the next few days.

Information Provided

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

18

Action ID No.:

Activity:

Correspondence - Do not go to Macro Access Screen

May 25, 2007

To:

Margueratt, Vanessa

Action Date:

From:

Fleming, Melanie

Document Date:

May 25, 2007

Description:

Provided preliminary comments on the provincial draft registration document to the province. Still waiting for detailed comments from Science Branch to forward to the province. Unsure if Science has received the official request for Science advice yet.

Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

19

Action ID No.:

Correspondence - Do not go to Macro Access Screen

May 29, 2007

To: s.19(1)

Action Date:

May 29, 2007

From: Fleming, Melanie

Description:

Science Branch's response to the proposed monitoring, of striped bass in the Shubenacadie River, sent by email to [REDACTED]

Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

20

Activity:

Action ID No.:

Correspondence - Do not go to Macro Access Screen

July 09, 2007

To:

Action Date:

July 06, 2007

From:

Document Date:

Margueratt, Vanessa

Description:

Final Report - Environmental Registration for the proposed natural gas storage project. (via reg mail). Entered and forwarded to assessor. Response requested by July 19/07.

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

21

Action ID No.:  
Action Date:  
Document Date:

July 18, 2007  
July 18, 2007

Meeting

Activity:  
To  
From:

Description: Attended meeting, organized and facilitated by Tana Worcester, with Science reps (i.e., Rod Bradford, Peter Amiro, Tim Milligan). Meeting notes on file. Science to follow up with advice expert opinion.

Action: Waiting/Pending Action by others

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

22

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

Action Date:

July 20, 2007

To:

Document Date:

July 20, 2007

From:

Description:

Letter regarding the review of the final provincial registration document sent to the province as part of the provincial environmental assessment. Detailed Science comments not yet available so will be sent at a later date.

Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:

Directory:

W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Col  
Alton Provincial Registration-Letter-July 20 2007 Final

File Name:

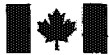
File Extension:

doc

Document Type (Upload):

File Size:

51,712



Fisheries and Oceans    Pêches et Océans  
Canada                      Canada

Habitat Protection & Sustainable Development Division  
PO Box 1006  
B505, 5<sup>th</sup> Floor  
Dartmouth, Nova Scotia  
B2Y 4A2

*Your file:*  
40100-30-128

July 20, 2007

*Our file:*  
06-W7-182

Ms. Vanessa Margueratt  
Nova Scotia Environment and Labour  
PO Box 697  
Halifax, Nova Scotia  
B3J 2T8

Dear Ms. Margueratt:

**RE: Review of the Provincial Registration Document, *Fisheries Act* and *Species at Risk Act* Reviews - Alton Natural Gas Storage Proposal, Colchester County, NS**

On July 9, 2007, Fisheries and Oceans Canada (DFO), Habitat Protection & Sustainable Development Division, received the document entitled "*Final Report, Environmental Registration for the Proposed Alton Natural Gas Storage Project*" dated June 14, 2007 for review. To expedite future correspondence or inquiries, please refer to the referral title and file number when you contact us.

Referral Title:    Shubenacadie River - Water Withdrawal and Effluent Release  
Habitat File No.: 06-W7-182

DFO has determined that this report failed to provide adequate information to support the prediction that effects to fish and fish habitat, which includes a species at risk, i.e., inner Bay of Fundy Atlantic salmon, are insignificant. There is uncertainty associated with effects to fish and fish habitat, i.e., fish and fish habitat as defined in the *Fisheries Act*, that could result from this project. Concerns focus around the following project components: water intakes, brine pre-mixing pond and brine discharge. These concerns include but are not limited to:

- a) Potential effects on fish, including species at risk, related to the withdrawal of water from the Shubenacadie River into both the water intake and the pre-mixing pond (e.g., the proponent has failed to show that striped bass eggs and larvae are not found in this location and would not be drawn into the water intake or pre-mixing pond intake).

.../2

**Canada**

- 2 -

- b) Potential effects on fish and fish habitat, including species at risk, related to the brine being discharged into the Shubenacadie River (e.g., fish kill resulting from the release of brine and behavioural effects, such as interference to Atlantic salmon migration patterns, related to the release of the brine).
- c) Potential effects on fish and fish habitat, including species at risk, related to the discharge of sediments into the Shubenacadie River (e.g., the sediment in the intake water that will be collected in the centrifugal separator system and discharged back into the Shubenacadie River).

DFO has determined that, based on the information provided to date, there is uncertainty in regards to the potential for certain works or undertakings associated with this project to contravene provisions of the Habitat Protection Provisions of the *Fisheries Act*, e.g., sections 32 and 35(1) shown below.

***Fisheries Act, Section 32*** – No person shall destroy fish by any means other than fishing except as authorized by the Minister or under regulations made by the Governor in Council under this Act.

***Fisheries Act, Subsection 35(1)*** – No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat.

Uncertainty also exists regarding the potential for certain activities associated with this project to contravene the *Species at Risk Act*, subsection 32(1), which states that “No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, endangered species or a threatened species”.

A DFO-led scientific peer review meeting of existing information and further exploration of potential mitigation and monitoring options may help to resolve the issues described above. However, there is a possibility that additional information would need to be collected prior to a final determination of the potential impacts of this project on fish and fish habitat, including species at risk.

...13



- 3 -

DFO will provide more specific comments as soon as they are finalized. If you have any questions or concerns, feel free to contact me by telephone at 426-8033, by fax at 426-1489 or by e-mail at [macleanma@dfo-mpo.gc.ca](mailto:macleanma@dfo-mpo.gc.ca).

Sincerely,

Melanie MacLean  
Habitat Assessment Biologist  
Maritimes Region

cc: Tana Worcester  
Craig Hominick  
André Gauthier

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: s.19(1)  
s.21(1)(a)  
s.21(1)(b)  
Telephone Conversation  
Action ID No.: 23  
Action Date: July 23, 2007  
Document Date:

Description: Melanie MacLean spoke with André Gauthier with Environment Canada. Details of conversation below:  
EC has not sent comments to the province yet. EC obtained an extension for provision of comments. Jeff Corkum reviewed the registration document but wanted to wait before responding. Their comments will go to Jane Roma in the Environmental Assessment Section, and be sent to the province from there.

However, there was enough information to determine that the effects of the brine solution being discharged into the Shubenacadie River would be non-acutely lethal. The salinity of the brine after dilution would be close to that which would be found at high tide. However, at low tide the salinity would be higher than normal. The salinity of the brine being discharged would still fall within the normal salinity range of the three spine stickleback which is the fish species that would be used in toxicity testing.

Action: No Change/No Action Required for this Activity  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:  
Time Spent (Hrs): 0.00  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity:

Telephone Conversation

To

From:

Action ID No.: 24

Action Date:

July 24, 2007

Document Date:

Description:

I (Melanie MacLean) spoke with Peter Geddes at NSDEL. Peter wanted to confirm that DFO believed that additional information would be required as this could affect the decision of their Minister. I confirmed that this was the case. I also mentioned that if the proponent was directed to collect additional information, perhaps they would want to further explore other options first.

Action:

No Change/No Action Required for this Activity

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

25

Action ID No.:

Correspondence - Do not go to Macro Access Screen

July 26, 2007

Activity:

To:

Action Date:

Document Date:

From:

Description:

Detailed Science comments sent to NSDEL as part of the provincial environmental assessment even though the comments were due by July 19, 2007.

Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:

Directory:

W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\ Alton Gas EA Science Response\_final

File Name:

File Extension:

doc

Document Type (Upload):

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87,040



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

Science

Sciences

Canadian Science Advisory Secretariat  
Science Response 2007/nnn

Maritimes Region

## SCIENTIFIC REVIEW OF THE ENVIRONMENTAL REGISTRATION DOCUMENT FOR THE PROPOSED ALTON NATURAL GAS STORAGE PROJECT

### Context

DFO Maritimes Science Branch was asked by the Habitat Protection and Sustainable Development (HPSD) Division to review the Province of Nova Scotia's Environmental Assessment Registration Document for the Alton Natural Gas Storage Proposal on May 24, 2007. It is expected that this Science Response will be used to assist HPSD in developing its own comments for the Province, as well as in making any Fisheries Act determinations related to this project. DFO Science was asked to address the following questions:

- 1) Could operation of the water intake result in the death of fish in the area of the intake? Has adequate information been provided to make a conclusion?
- 2) Could operation of the brine mixing pond result in the death of fish? Could the release of the diluted brine impact on the health or behaviour of fish? Has adequate information been provided to make a conclusion?
- 3) Is additional information required in order to predict effects on Atlantic salmon, related to the operation of the water intake and brine mixing pond? Could Atlantic salmon be harmed by the operation of the water intake and brine mixing pond?
- 4) Is the recommended mitigation and monitoring associated with the water intake and brine mixing pond appropriate? Are there any further recommendations for mitigation and monitoring?
- 5) Are there any other issues that should be flagged at this time?

This is the first project of this nature to be reviewed by DFO Science in the Maritimes Region, and no framework currently exists to support review of such a project. A preliminary response has been provided through the Special Science Response process; however, more detailed scientific peer review and assessment of the potential impacts of this project is recommended to fully address the questions that have been posed.

### Background

Alton Natural Gas Storage Limited Partnership has submitted a proposal to the province of Nova Scotia to develop an underground hydrocarbon storage facility in a series of engineered salt caverns near Alton, Nova Scotia. The potential environmental effects of this proposal are being assessed through the province's Environmental Assessment (EA) process. DFO Habitat Management will provide comments to the province to support this EA process, and DFO will also be required to make its own determination of potential project impacts under the Fisheries Act.

Water is proposed to be withdrawn from the Shubenacadie River Estuary (approximately 25 km from the mouth of the estuary) for use in the development of the salt caverns, as well as to dilute the wastewater being returned to the Shubenacadie River after use. Wastewater produced during the construction of this project would be discharged to the Shubenacadie River after dilution in a mixing pond. Construction along the banks of the Shubenacadie River would be required to install water intakes and outflows. If activities proceed as planned, the brining process may last 8-10 years. The storage facility is being designed to provide service for a minimum of 50 years.

## **Response**

The Shubenacadie River is a regionally unique tidal river with the longest tidal bore in Nova Scotia. A number of regionally rare species are dependant on this river to carry out their life-history processes, these include inner Bay of Fundy Atlantic salmon (currently listed as endangered under Schedule 1 of the Species at Risk Act), striped bass (currently being assessed by the Committee on the Status of Endangered Wildlife in Canada) and Atlantic sturgeon (red listed by the province of Nova Scotia). Additional species that are either resident or seasonal inhabitants of the tidal Shubenacadie River include: brook trout, brown trout, alewife, blueback herring, American shad, rainbow trout, American eel, rainbow smelt, stickleback, winter flounder, smooth flounder, mummichog, Atlantic silverside, Atlantic tomcod, Atlantic herring, northern pipefish, sea lamprey, yellow perch, white perch, smallmouth bass, chain pickerel, and cyprinids.

The Shubenacadie River Estuary is an extremely dynamic environment, with a tidal bore that travels 30 km up from the river mouth. The site currently proposed for water withdrawal and discharge for the Alton Salt Dome project is a location of large extremes in the relative proportions of seawater and freshwater, total flow, suspended sediment, and water temperature and salinity. These extremes can be expected twice daily and monthly in response to the diurnal- and spring-neap tidal cycles respectively, and both seasonally and daily with weather conditions. In the estuarine portion of the Shubenacadie River Estuary high sediment concentrations can be expected to significantly influence the hydrodynamics in the river at certain times of the year. Deposition of highly mobile sediment concentrations will influence channel morphology, and therefore the presence of fluid mud could significantly reduce mixing of fresh, marine and introduced brine waters in the estuary. This high degree of natural variability introduces a high level of uncertainty into predictions of potential impacts to fish and fish habitat and may complicate the management regime needed to ensure that water withdrawal and discharge are conducted in a manner that do not result in harm to fish and fish habitat. The Environmental Registration Document does include a reference to the relative amount of water that would be withdrawn from the Shubenacadie River Estuary as compared to the amount of water potentially present. However, this calculation is based on the maximum ebb flows and does not reflect potential flow reductions at any one point in time. On average, the proposed water withdrawals are likely to be low relative to total water flows.

The proponent conducted preliminary characterization of the proposed site for water withdrawal and discharge between October and December 2006. Results while indicative of natural variability, did not adequately resolve the variability that can be anticipated to occur at this site on daily, monthly, seasonal, and interannual time scales. The tidal range at the proposed outflow site was approximately 2 to 4 m in November. Salinities at the discharge site ranged from 0 to 18 ppt between November and December. Lowest salinities appeared to occur in December when tidal range was low and freshwater inputs (i.e., rain, snow) were high. One

## **Maritimes Region**

## **Alton Natural Gas Storage Project**

sample collected by the proponent in October had a Total Suspended Solids (TSS) level of 340 mg/L (Jacques Whitford, 2007, p. 45). It is not known what the location, depth, tidal or weather conditions were at the time this sample was taken. Water samples collected in October on the ebb and flood tides near the proposed discharge site had turbidities of 93 NTU (ebb) and 180 NTU (flood). These levels were measured during a period of high freshwater runoff and low salinity (<1 ppt) and were not calibrated to provide estimates of TSS. High levels of fine sediment may be difficult to remove from intake water with the proposed centrifugal separator system.

A striped bass baseline monitoring proposal was provided to DFO Science on May 16, 2007. A review of this proposal is included in Appendix A.

There are a number of information gaps within the Environmental Registration document that, if filled, would be helpful in the determination of potential impacts to fish and fish habitat. These include the expected chemical composition of the discharge brine relative to the natural range in the chemical composition of the estuarial water at the proposed project discharge location. Also, a better understanding of water circulation throughout the year, in addition to the studies that focused only on the Oct-Dec period. Estimates of the range of temperature and dissolved oxygen concentrations of the discharge water entering the Shubenacadie River will be required to determine potential effects on fish species – particularly during the winter months when some species of fish may be especially responsive or sensitive to temperature gradients or transient cells of warmer or cooler water.

The Environmental Registration document has not addressed potential cumulative effects of this project in relation to other proposed development projects in the Bay of Fundy, such as the proposed tidal power projects in the Bay of Fundy. Potential interactions between these projects may exist. For example, changes to the tidal regime or distribution/consumption of sediments within the Bay of Fundy, would likely influence tidal incursion and flow rates at the proposed location of the Alton Salt Dome water withdrawal and discharge. A Strategic Environmental Assessment of ocean renewable energy is currently being conducted for the Bay of Fundy to provide information on the potential impacts of tidal energy.

Information on mitigation options presented within the Environmental Registration document were not considered to be adequate to determine their potential effectiveness at minimizing impacts to fish and fish habitat. For example, the effectiveness of fish screens and the proposed two-week operational shutdown during peak spawning of striped bass at minimizing entrainment of eggs, larvae and juveniles of a variety of fish species is unknown at this time.

The uncertainties of potential impacts on fish and fish habitat as well as more general ecological considerations associated with the proposed locations suggest further project alternatives and/or mitigation options need to be explored.

Alternative locations for water withdrawal have not been assessed in the Registration document. There may be several advantages of withdrawing water from a less saline environment, such as a lake. For example, suspended sediments may be reduced, water flow rates may be easier to predict, sensitivities of fish and fish habitat may be reduced. Additional work would be required to develop sound science advice on this issue. While several options for brine discharge appear to have been explored by the proponent, details related to the assessment of discharge into the Cobequid Bay have not been provided within the Environmental Registration document. Discharge into the marine environment may have several advantages. For example, the ratio of water discharges to water present would be much lower, water flow rates would be more predictable and discharge timing may be less dependant

## **Maritimes Region**

## **Alton Natural Gas Storage Project**

on timing and environmental conditions. It would be informative to discuss the impacts of best case locations for water withdrawal and discharge independent of constraints, relative to any proposed location. Additional work will be required to provide science advice on this issue.

This is considered to be only a preliminary evaluation of the potential impacts of the proposed Alton Salt Dome project on fish and fish habitat (including species at risk) and of mitigation and monitoring options. A more comprehensive and inclusive peer review of the available information is recommended to provide a sound scientific basis for decision-making. Such a review could potentially be conducted within the next few months. However, such a review could potentially identify additional information or studies that may be required to resolve the question posed by DFO Habitat Management, which may require additional time and resources.

### **Conclusions**

The Shubenacadie River Estuary at the proposed location of water withdrawal and discharge for the Alton Salt Dome project is a dynamic receiving environment possessing a high level of natural variability, which has not been fully characterized within the Environmental Registration document. Existing uncertainties associated with natural variability in the underlying physical and climatological dynamics of, and their interaction within, the receiving environment complicate the task of prediction of potential environmental effects on aquatic ecosystem components. Both the design and implementation of measures to mitigate the impacts to aquatic ecosystem components, such as the timing of brine discharge, may be therefore equally complicated.

Given the presence of a species listed as endangered species under the Species at Risk Act (inner Bay of Fundy salmon) and other regionally rare and sensitive species (striped bass and Atlantic sturgeon), it is expected that a lower than average level of risk tolerance may be applied to projects proposed for this environment. At present, the Environmental Registration document contains insufficient information to enable full evaluation and risk assessment of the potential impacts to aquatic ecosystem components, including species at risk.

Given that advice has not been provided by DFO Maritimes Science on this type of project in the past, and given that this is only a preliminary evaluation of the information contained within the Environmental Registration, it is recommended that a DFO-led scientific peer review meeting be conducted to more fully evaluate the scientific and technical information available for this project, to discuss additional mitigation and monitoring options, to determine what information may be required (if any) to address outstanding knowledge gaps.

### **Contributors**

T. Worcester (lead author)  
P. Amiro  
R. Bradford  
G. Bugden  
T. Milligan

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DFO Maritimes Science  
DFO Maritimes Science  
DFO Maritimes Science

### **Approved by**

Mike Sinclair

Regional Director, Maritimes Science



## **Sources of information**

Jacques Whitford. 2007. Environmental Registration for the Proposed Alton Natural Gas Storage Project. Final Report.

### **This Report is Available from the:**

Center for Science Advice (CSA)  
Maritimes Region and Gulf Region  
Fisheries and Oceans Canada  
P.O. Box 1006, Stn. B203  
Dartmouth, Nova Scotia  
Canada B2Y 4A2

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E-Mail: [XMARMRAP@mar.dfo-mpo.gc.ca](mailto:XMARMRAP@mar.dfo-mpo.gc.ca)

Internet address: [www.dfo-mpo.gc.ca/csas](http://www.dfo-mpo.gc.ca/csas)



### **Correct Citation for this Publication:**

DFO, 2007. Scientific Review of the Environmental Registration Document for the Proposed Alton Natural Gas Storage Project. DFO Can. Sci. Advis. Sec. Sci. Resp. 2007/nnn.

## **Appendix A**

### **Scientific Review of the May 16, 2007 "Striped Bass Egg and Larvae Monitoring Proposal"**

Based on the information that is known about the Shubenacadie-Stewiacke striped bass population, DFO Science has suggested an alternative monitoring and evaluation approach. These suggestions are intended to improve the basis for assessing the feasibility of mitigating the effects of the brine discharge process, for age 0+ year diadromous fishes, including striped bass.

Some things which are known about the Shubenacadie-Stewiacke striped bass population include:

- striped bass eggs will occur in abundance within the vicinity of the proposed area of activity,
- there is substantive inter-annual variability in timing and duration of the spawning season,
- spawning is triggered when water temperatures rise to approximately 16°C,
- spawning events can be of very short duration (e.g., measured in hours and possibly minutes on some days), and
- spawning events are largely independent of the spring-neap cycle, as was hypothesized by Rulifson and Tull (1999).

These features (i.e., listed above) indicate that while a predictive basis (e.g., real time water temperature data) to scheduling water extraction and/or brine release around striped bass spawning activity is feasible,

- 1) a high degree of active management would be required, and
- 2) it would probably not satisfactorily minimize risk of entrainment and/or exposure to brine to not only the eggs but to larvae and young juveniles.

It is suggested that the simplest and safest recourse is not to allow activities associated with the dilution and discharge of brine to take place during the striped bass spawning season. Late April to early July is a sensitive period for most of the other local populations of diadromous fish species, for spawning (e.g., alewife, blueback herring, American shad, Atlantic silversides, rainbow smelt), for outmigration (e.g., inner Bay of Fundy Atlantic salmon smolts), or recruitment to the river (e.g., American eel elvers). Collectively, these processes represent a level of biological complexity that could not easily be accommodated within a mitigation framework.

Therefore, it is suggested that the proponent focus on monitoring and evaluation activities that can be linked to specific actions that would be taken to mitigate the effects on very young fish. As stated in the proposal, these actions are entrainment into the water intake and the brine dilution facility, and exposure to effluent from the facility.

#### **Entrainment**

Fish screening specifications would need to accommodate both a target flux of estuarial water while effectively preventing fish from entering the intake (i.e., fish size relative to screen mesh size, and risk of impingement at a given velocity of water through the screening). A reasonable approach, therefore, would be to define the seasonal growth trajectory of the smallest age

## **Maritimes Region**

## **Alton Natural Gas Storage Project**

classes (i.e., those most susceptible to entrainment) and thereby identify the date that the brine dilution and release phase could begin for a given screening configuration.

A robust growth model for Age 0+ striped bass has been developed. It has been shown previously that application of the growth model to size at age information and water temperatures can satisfactorily capture the seasonal growth trajectory of wild, age 0+, Shubenacadie-Stewiacke striped bass. The striped bass monitoring component could therefore be oriented around sampling of juvenile striped bass (July onward) to define the seasonal growth profile, and thereby determine the approximate date that entrainment through the screens could be discounted. The growth model, and summer water temperature information, could be made available to assist with an assessment of inter-annual variability in the date that dilution/discharge of brine could begin.

There are no comparable growth models for the other local populations of diadromous fishes. Temporally stratified (minimally bi-weekly) sampling of the juvenile fish assemblage within the inner portions of the Shubenacadie River Estuary would yield information on the screening requirements to eliminate entrainment, and whether screening is feasible. (Size at age will vary substantively among species. Juvenile alosine fish will be much smaller than striped bass juveniles of the same age (i.e., days) for example).

### **Exposure**

It is doubtful that any information concerning the effects of exposure to brine (at varying concentrations) is available for any or most of the diadromous species present within the Shubenacadie River Estuary. However, the infrastructure and expertise to assess the effects of exposure to brine on juvenile diadromous fish is available at a local university. The need to look at exposure effects would be contingent upon the relative difference between the chemical composition of the brine and seawater occurring naturally in the river. If the proponent cannot produce information that shows the chemical properties of the brine at the point of discharge:

- a) does not differ from that of seawater, and
- b) would not harm fish at the proposed dilution, upon release into the river,

then it is recommended that studies be scheduled to assess both the lethal and sub-lethal effects of exposure, minimally on juvenile striped bass.

None of the above is intended to imply that fulfillment of the activities recommended in this document will address all fish conservation issues. Rather the suggestions should be regarded as advice on where the proponent might more effectively direct their monitoring activities in 2007.

### **Reference:**

Rulifson, R.A. and K.A. Tull. 1999. Striped bass spawning in a tidal bore river: the Shubenacadie Estuary, Nova Scotia. Transactions of the American Fisheries Society 128:613-624.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

26

Action ID No.:

Correspondence - Do not go to Macro Access Screen

July 30, 2007

Document Date:

July 30, 2007

Activity:

To:

From:

Description:

Advised by NSDEL that the Science advice may still be used by the Minister in making his decision even though it is past the comment period, and that the comments would be placed in the library.

-----Original Message-----

From: Candace M Harding [mailto:[HARDINCZ@gov.ns.ca](mailto:HARDINCZ@gov.ns.ca)]

Sent: July 30, 2007 8:30 AM

To: MacLean, Melanie A

Subject: Re: DFO Science Review of the Provincial Registration Document for the Alton Natural Gas Storage Project

Hello Melanie,

All comments received by NSEL regarding proposed projects are copied for our files and are used by the Minister in making his decision regarding the project Comments received outside the comment period are considered if possible, and are still viewed as public information. The documents you submitted will be copied and on display in our library for anyone interested in viewing them. I hope this answers your question, however, please feel free to contact me for any additional information.

Thank you for your submission,  
Candace Harding

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:



Fisheries & Oceans  
Pêches et Océans

Warning: Information in PATH may be private and/or sensitive and should not be shared without appropriate consultation and/or permission. Refer to the Data and System Security section of the PATH Helpfiles for details

Habitat Management

000037

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

27

Action ID No.:

Correspondence - Do not go to Macro Access Screen

July 31, 2007

To

Action Date:

From:

Document Date:

July 31, 2007

Description:

Email rec'd from Canace Harding, DEL - Ministers Decision - additional information required prior to decision. Entered and original email with attachment forwarded to assessor.

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:

Directory:

W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\ email to assessor FW Environmental Assessment Dec

File Name:

File Extension:

txt

Document Type (Upload):

File Size:

1,508

Directory:

W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\ July 31-07 Additional info required by Minister\letter

File Name:

File Extension:

pdf

Document Type (Upload):

File Size:

167,543

email to assessor EA Decision.txt

Subject: FW: Environmental Assessment Decision - Alton Underground Natural Gas Storage Facility

Attachments: Ministerletter.pdf

-----Original Message-----

From: Dube, Joy  
Sent: July 31, 2007 1:52 PM  
To: MacLean, Melanie A  
Subject: FW: Environmental Assessment Decision - Alton Underground Natural Gas Storage Facility

Melanie

I have made a entry to the action log of your file 06W7-182, to reflect the receipt of this information. This email and attachment have been linked.

Joy

-----Original Message-----

From: Candace M Harding [mailto:HARDINCZ@gov.ns.ca]  
Sent: July 31, 2007 1:40 PM  
To: bill.coulter@ceaa-acee.gc.ca; barry.jeffrey@ec.gc.ca; Roger Aggas; Andrew Paton; Brent K Baxter; David R Briggins; Andrew D Cameron; David B Hopper; Wayne D Faulkner; Hugh J Gillis; G Murray Hill; Jo-Anne G Himmelman; Scott W Lister; Darlene MacDonald; Heather Marsten; Andrew J Murphy; Robert Ogilvie; Elizabeth Pugh; Tony Lamport; Julie K Towers; Ernest Walker; Dube, Joy; RIPLEYC@tc.gc.ca  
Subject: Environmental Assessment Decision - Alton Underground Natural Gas Storage Facility

On July 31, 2007 the Minister of Environment and Labour released a decision concerning the proposed Alton Underground Natural Gas Storage Facility. The Minister has decided in accordance with Section 13(1)(a) of the Environmental Assessment Regulations that Additional Information is required before a decision can be made.

Thank you,  
Candace Harding  
Environmental Assessment Intern  
NSEL



Department of  
Environment & Labour

PO Box 697  
Halifax, Nova Scotia  
B3J 2T8

**Our File Number:**  
40100-30-128

Office of the Minister \_\_\_\_\_

[Original Dated: July 31, 2007]

Mr. Scott G. McDonald, Project Manager  
Alton Natural Gas Storage LP  
PO Box 36052  
Halifax, NS  
B3J 3S9

Dear Mr. McDonald:

**Re: Environmental Assessment - Alton Underground Natural Gas Storage Facility**

The environmental assessment of the proposed Alton Underground Natural Gas Storage Facility, has been completed.

This letter is to advise that, pursuant to Section 13 (1)(a) of the *Environmental Assessment Regulations*, I have determined the registration information is insufficient to allow me to make a decision, and that I require additional information.

Fisheries and Oceans Canada (DFO) and other interested stakeholders, raised concerns that the report failed to provide adequate information to support the prediction that effects to fish and fish habitat, which includes a species at risk (Inner Bay of Fundy Atlantic Salmon), are insignificant. Concerns include the effects of the withdrawal of water from the Shubenacadie River into both the water intake and the pre-mixing pond; the brine being discharged into the Shubenacadie River; and the discharge of sediments into the Shubenacadie River. DFO has determined that, based on the information provided to date, there is uncertainty in regards to the potential for certain works or undertakings associated with this project to contravene provisions of the Habitat Protection Provisions of the *Fisheries Act*, and the *Species at Risk Act*.

- Alton Natural Gas LP. shall provide additional information to demonstrate that the prediction that project related effects to fish and fish habitat from the development, operation, and maintenance of the Alton Underground Natural Gas Storage Facility are insignificant. This information shall be prepared in consultation with Fisheries and Oceans Canada.

Concerns have also been raised regarding potential impacts of the project on First Nations. Additional information is required to demonstrate how First Nation concerns would be considered in the development and operation of the undertaking. Specifically this should include:

- Details of discussions with First Nations regarding potential environmental effects of the project, and issues identified through these discussions. Plans for addressing identified First Nations' concerns including procedures to deal with project-related issues that may arise, and ensuring issues are recorded and resolved in a timely manner.

Please note, other issues were raised during the review process and the comments are attached for your information.

The requested additional information shall be submitted by Alton Natural Gas LP. at your convenience, as an addendum to the original registration information. Pursuant to Section 13(1) of the *Environmental Assessment Regulations* decision options available to me are: additional information is required; approval with conditions; focus report is required; environmental assessment report required; or, rejection. Upon submission of the information I will have 25 days to make my decision.

Alton Natural Gas LP. shall not commence the undertaking or any part thereof until the undertaking has been approved under Part IV of the *Environment Act*.

Yours truly,

[Original Signed By]

Mark Parent  
Minister

cc mailed to: Landis Energy Corporation  
Suite 2320, 444-5th Avenue SW  
Calgary, AB  
T2P 2T8



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity:

Meeting

Action ID No.:

28

Action Date:

August 08, 2007

To:

Document Date:

From:

Description:

Meeting

Provincial EA - Alton Natural Gas Storage Project

August 8, 2007

Attendees:

s.19(1)

JWEL:

Proponent: Scott McDonald, Paul MacLean

Province: Peter Geddes, Vanessa Margueratt

DFO: Melanie MacLean

Once the additional information that responds to the NSDEL Minister's letter is filed, there will be a 25 day public review period. The additional information will be circulated to the same parties that received the Registration Document.

The two major parties who expressed concerns that need to be addressed are First Nations and DFO.

First Nations: The proponent will file supplemental information on details of discussions and plans for addressing concerns. They can document what has already been done. They will follow up with Roger Hunka to get concerns on the table and decide how to deal with them.

The provincial government will be developing policy on dealing with consultation requests from First Nations.

Discussed some of the comments\concerns expressed by DFO during the review of the draft Registration Document, Registration Document, and the Striped Bass Monitoring Plan.

Intake - as an alternative to monitoring, the intake could be shut down during the critical time period for striped bass, timing of spawning appears to be related to water temperature

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Brine Discharge - brine will be released when salinities are the highest, salinity will not be allowed to go beyond ambient levels, more design work going on, salinity monitoring ongoing, there is a commitment to do the toxicity testing

I mentioned that concerns go beyond toxicity - will there be any health or behavioural impacts on fish related to the discharge of brine.

Discussed the removal of suspended solids from the intake water and their release back into the river. I mentioned that it needs to be shown that this would not harm fish/fish habitat. As with the brine, keeping levels within ambient levels does not automatically demonstrate that there will not be any adverse effects.

#### Holding Pond

I also mentioned that it was not expressed in the letter but DFO wanted to have confidence that the holding pond would be designed to avoid events that could result in breaching and the release of the water from the holding pond directly into the Shubenacadie River. The proponent is doing geotechnical work (e.g., penetration test, wells and test pits) to get additional information on soil conditions at the site where the holding pond would be constructed. The pond will probably have to be dredged and this sediment will probably be disposed of on-land. Pond design work is ongoing.

The proponent has contracted Bob Rutherford to help with the aquatic side of the assessment. They will bring Martec back for the physical oceanography work. A river engineer from Matrix will be carrying out work as well.

Suggest that a workshop be held late August/early September, with DFO, the proponent and the province participating, to move forward in response to the NSDEL Minister's letter. If some concerns can be addressed by using provincial Conditions of Approval, that would be acceptable.

The proponent would like to re-file around the end of September, early October.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

29  
August 15, 2007

Action ID No.:  
Action Date:  
Document Date:

Telephone Conversation

Activity:  
To  
From:

Description:

I spoke with Tana. Tana suggested that the next step would be a peer review meeting that would involve not only DFO but academics. Tana could meet with the consultant to explain DFO's response and then give an opportunity to ask questions though. This meeting wouldn't involve the scientists. I will contact the consultant and discuss next steps.

Action:

Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:

0.00

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity: Meeting  
To: 30  
From: September 19, 2007  
Action ID No.:  
Action Date:  
Document Date:

Description: A meeting was held, at the request of the proponent., Participants included a facilitator, representatives of the proponent, DFO Science, consultants working on behalf of the proponent, the province and myself (Melanie MacLean).

Action: Information Provided  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Note to File  
To: 31  
From: September 25, 2007  
Document Date:

Description: File placed on hold awaiting additional information from the proponent. Information will be provided as part of the provincial environmental assessment.

Action: No Change/No Action Required for this Activity  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Correspondence - Do not go to Macro Access Screen  
To: Action ID No.: 32  
From: Action Date: November 26, 2007  
Document Date: November 23, 2007

Description: Received Supplemental Information Report from NSEL for review. Information provided to Tana for circulation to Science reviewers.

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:  
Time Spent (Hrs): 0.00  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity: Note to File  
To: 38  
From: December 10, 2007  
Description: EA&MP attended a consultation led by the province with the Assembly of Nova Scotia Chiefs.  
Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:  
Time Spent (Hrs): 0.00  
Authorization Rationale:



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity: Correspondence - Do not go to Macro Access Screen  
To: 33  
From: December 11, 2007  
Document Date: December 11, 2007

## Description:

DFO provided comments to NSEL on the Supplemental Information Report. Comments were late - they were due on December 6th. DFO recommended that the proponent provide additional information in relation to previously identified knowledge gaps before a decision is made on whether or not to issue a provincial environmental assessment approval.

## Action: Information Provided

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00

## Authorization Rationale:

## Directory:

W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\Alton Supplemental Information-Letter-December 11 ; File Extension: doc  
File Size: 50,176

## Document Type (Upload):

## Directory:

W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\Alton Gas EA Supplemental Response\_final File Extension: doc  
File Size: 81,408

## File Name:

## Document Type (Upload):

## **Scientific Review of the Supplemental Information to the Environmental Registration for the Proposed Alton Natural Gas Storage Project**

### **Context**

DFO Maritimes Science Branch was asked by the Habitat Protection and Sustainable Development (HPSD) Division to review a report entitled "Supplemental Information to the Environmental Registration for the Proposed Alton Natural Gas Storage Project" on November 26, 2007. A response was requested by December 7, 2007.

### **Background**

A review of the Environmental Registration for the Proposed Alton Natural Gas Storage Project was completed by DFO Science in July 2007 (DFO 2007). On September 19<sup>th</sup>, a meeting was held with the Province of Nova Scotia and the proponent, Alton Natural Gas Storage L.P., to review DFO's comments and concerns. On November 23<sup>rd</sup>, Alton Natural Gas Storage registered supplemental information to the Alton Natural Gas Storage Project environmental assessment, in accordance with Part IV of Nova Scotia's *Environment Act*, with the Province of Nova Scotia.

### **Response**

An effects monitoring plan has been outlined in the Supplemental Information to the Environmental Registration for the Proposed Alton Natural Gas Storage Project report, albeit without frequency or duration solidly indicated.

Biological risks have not been quantified in the report because of the paucity of population abundance and timing information. The contractor, Jacques Whitford, has stated that in their opinion there are few and low risks to any aquatic species and that effects monitoring will uncover these unacceptable events. However, this paucity of information may or may not be true. For example, the population of Atlantic salmon is relatively well known and the risk tolerance is very low. The status of other species are less certain and, therefore, there may be higher acceptable risk tolerances but these levels are unknown. Therefore, constructing informative risk assessments for the aquatic species listed may not be achievable in a reasonable time, and effects monitoring may be the only way forward. The scenario and contingency plans presented call for shutting down the pumping if unacceptable results occur. However, the rules for shutdown and restarting are not explicitly clear and require further documentation and review. In the case of eggs and larvae in the intake, it was a very small amount of mortality and, therefore, one assumes that benchmarks for other decision rules would be as stringent.

Modeling of the brine field extent is much better developed. However, effects monitoring in the brine field is much more difficult and significant impacts may occur based on even subtle alterations of the environment. Therefore, it would seem appropriate that the proponents would be advised to participate in any fish migration monitoring research that is taking place in the estuary both before and during any project development. Considering that the peak brine will not be reached until 96 weeks after initialisation of the first cavern and that four caverns are planned, there are at least four periods that require intense monitoring. Impacts on the environment and subsequently on aquatic species could be both episodic and cumulative. Therefore, an effects monitoring plan will be required over a

lengthy period of time, be diverse enough to detect impacts on at least the named species, and frequent enough to detect impacts above benchmark limits in a timely manner.

There are concerns that the proponent is underestimating the effect of high sediment load on the project and consequently underestimating the potential impact of the project on the environment. There is insufficient information on the sedimentary environment at the proposed site. Suspended sediment concentrations in the Salmon River, ~10 km kilometres northeast of the Shubenacadie River, range from  $<1 \text{ g l}^{-1}$  to  $946 \text{ g l}^{-1}$  with mean values ranging from  $146 \text{ g l}^{-1}$  to  $185 \text{ g l}^{-1}$  (Crewe, 2004). The sediments are composed of 60-80% silt and clay (Crewe 2004). Similar values can be found in other Minas Basin estuaries. Conditions at the proposed site could differ from those in the adjacent estuary, but without data it is impossible to assess possible interactions between the project and the natural sedimentary environment. This lack of data limits the proponent's ability to predict infill rates for the mixing channel and the intake structure. Studies in the Peticodiac River show that a 5 m water column with an initial sediment concentration of  $10 \text{ g l}^{-1}$  can produce a fluid mud layer on the order of 2 m thick (Figure 1). This layer is not re-suspended during the ebb even though surface currents exceed  $1 \text{ m s}^{-1}$ . Consolidation of this mud layer could lead to frequent maintenance dredging and significant amounts of material for disposal. It could also lead to clogging of the intake structure.

These effects may not lead to direct adverse effect on the biota, but failure to address them could significantly impact the operation of the facility and the ability of the operators to respond to unacceptable events. The proponents have already rejected discharge alternatives based on point discharge or dispersal across the river channel, and it is unclear what approach would be taken should the current approach not work as expected. For example, if frequent dredging were required, how and where would the sediment be disposed?

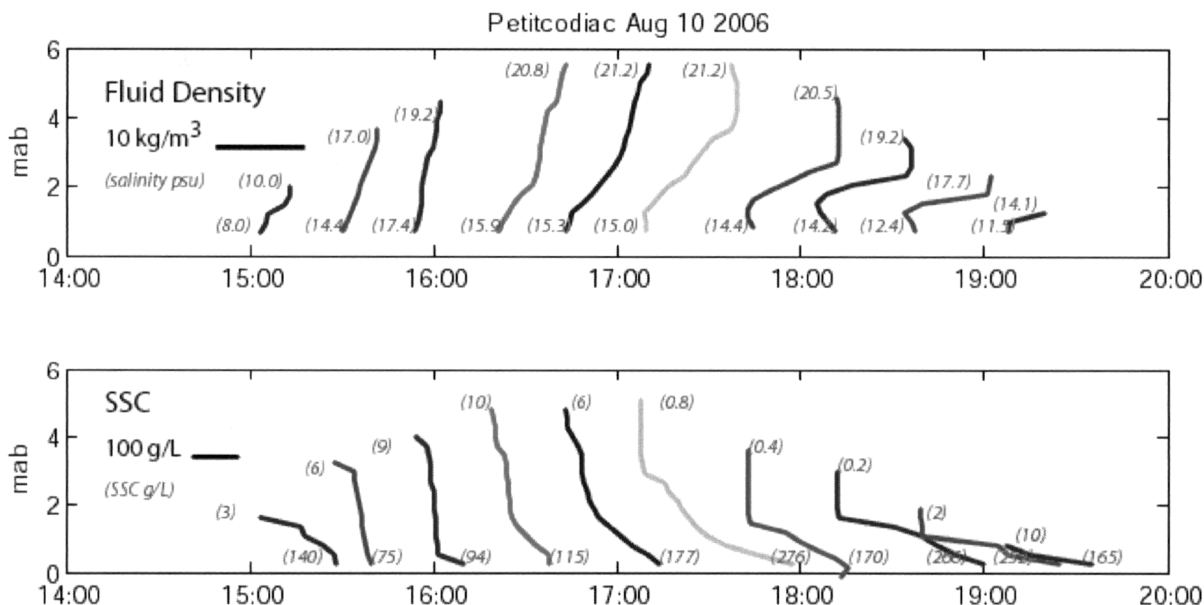


Figure 1: Graphs showing water column profiles of fluid density determined from salinity and temperature (upper panel) and suspended sediment concentration (lower panel) observed in the Petitcodiac River. Values in brackets at the top and bottom of each profile are from discrete samples. Note the creation of a sharp lutocline in the SSC profiles at 17:00 that persists during the ebb. Current velocity at the surface reached  $1.2 \text{ m s}^{-1}$  between 18:00 and 19:00.

The reliance on historic air photos as proof of the stability of the channel is questionable. The reason that the shape of the channel and the location of the sand bars have been relatively constant for 34 years is that the river has been stabilized by dykes, but it is unclear if the dyke was breached in this relatively short time or has been repaired following a breach. Regardless, since the proponent plans to alter the channel by creating a side channel, the existing morphology can be expected to adjust to both the diversion of flow and the creation of new stream lines at the entrance and exit of the mixing channel. Rapid deposition of sediment is likely to occur in any areas where bottom stress is decreased and erosion can be expected where stress increases. Some discussion as to the extent and significance of this readjustment of flow is required.

The total increase in the salinity of the entire Bay of Fundy resulting from the introduction of the brine was not a principle concern. Calculation of salinity to the 8<sup>th</sup> decimal place based on any initial salinity and total volume exchange does little to contribute to an understanding of how this project will affect the environment. What is of concern is how much the salinity would be expected to increase under a range of extreme flows and tide conditions in the immediate vicinity of the outfall, including the cumulative effect of the discharge from the mixing channel on the water within one tidal excursion.

Finally, the documents concerning the permit conditions for the Potash Project that discharges into the St. John River Estuary/Bay of referred to in the September 19<sup>th</sup> meeting with Alton Gas Storage L.P. were not provided.

### **Conclusions**

From an environmental and habitat point of view, the supplemental information that has been provided by Alton Gas is much better developed than the original assessment. Many of the concerns and questions raised by DFO Science have been addressed in some way, and an effects monitoring plan, albeit without frequency or duration solidly indicated, is outlined. There is better treatment of the risks and responses to unexpected outcomes in this update. There is stated understanding that actual outcomes are not precisely predictable, but the margins of expected errors are well below environmental benchmarks (not always referenced) and impacts and, therefore, the proponent concludes that there is low risk to aquatic populations. Sufficient information and analysis of the potential impacts of sedimentation, salinity, and flow alterations to aquatic organisms have not been provided to the extent that a conclusion of "no significant impact" can be made with high confidence. Based on the data and analysis presented, the position put forward by the proponent is essentially a professional opinion where potential risks are mitigated by an effects monitoring plan. Additionally, engineering and operational responses to unacceptable events are unknown and may require significant alteration of the pumping and discharge structures, quantities or locations and would, therefore, require reassessment. Further assessment by DFO Science on the mitigation of risks to the aquatic environment and organisms derived from the proposed environmental effects monitoring plan would require a review of an explicit plan relative to the final configuration of the project.

### **Contributors**

P. Amiro (author)	DFO Maritimes Science
R. Bradford	DFO Maritimes Science
G. Bugden	DFO Maritimes Science
T. Milligan (author)	DFO Maritimes Science
T. Worcester (author)	DFO Maritimes Science

### **Approved by**

Mike Sinclair	Regional Director, Science, Maritimes Region
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### **Sources of information**

Crewe, B.C., 2004. Characterization of sediment in the Salmon River, MSc. Thesis, Dalhousie University and Nova Scotia Agricultural College, xi+126pp.

DFO, 2007. Scientific Review of the Environmental Registration Document for the Proposed Alton Natural Gas Storage Project. DFO Can. Sci. Advis. Sec. Sci. Resp. 2007/013.

## 2nd Science Response

- effects monitoring plan provided but with inadequate details (e.g., timing, frequency)
- biological risks have not been quantified in the report because of the lack of population abundance and timing information.
- uncertainty with the opinion that there are few and low risks to any aquatic species and that effects monitoring will uncover these unacceptable events; constructing informative risk assessments for the aquatic species listed may not be achievable in a reasonable time, and effects monitoring may be the only way forward.
- the rules for shutdown and restarting are not explicitly clear and require further documentation and review.
- it would be appropriate that the proponents participate in any fish migration monitoring research that is taking place in the estuary both before and during any project development; considering that the peak brine will not be reached until 96 weeks after initialisation of the first cavern and that four caverns are planned, there are at least four periods that require intense monitoring.
- an effects monitoring plan will be required over a lengthy period of time, be diverse enough to detect impacts on at least the named species and frequent enough to detect impacts above benchmark limits in a timely manner.
- There are concerns that the proponent is underestimating the effect of high sediment load on the project and consequently underestimating the potential impact of the project on the environment. There is insufficient information on the sedimentary environment at the proposed site. Conditions at the proposed site could differ from those in the adjacent estuary, but without data it is impossible to assess possible interactions between the project and the natural sedimentary environment. This lack of data limits the proponent's ability to predict infill rates for the mixing channel and the intake structure. Consolidation of a mud layer could lead to frequent maintenance dredging and significant amounts of material for disposal. It could also lead to clogging of the intake structure. These effects may not lead to direct adverse affect on the biota, but failure to address them could significantly impact the operation of the facility and the ability of the operators to respond to unacceptable events.
- The reliance on historic air photos as proof of the stability of the channel is questionable. Regardless, since the proponent plans to alter the channel by creating a side channel, the existing morphology can be expected to adjust to both the diversion of flow and the creation of new stream lines at the entrance and exit of the mixing channel. Rapid deposition of sediment is likely to occur in any areas where bottom stress is decreased and erosion can be expected where stress increases. Some discussion as to the extent and significance of this readjustment of flow is required.

- the total increase in the salinity of the entire Bay of Fundy resulting from the introduction of the brine was not a principle concern. What is of concern is how much the salinity would be expected to increase under a range of extreme flows and tide conditions in the immediate vicinity of the outfall, including the cumulative effect of the discharge from the mixing channel on the water within one tidal excursion.

### **Conclusions**

Sufficient information and analysis of the potential impacts of sedimentation, salinity and flow alterations to aquatic organisms have not been provided to the extent that a conclusion of "no significant impact" can be made with high confidence.

Based on the data and analysis presented, the position put forward by the proponent is essentially a professional opinion where potential risks are mitigated by an effects monitoring plan.

Additionally, engineering and operational responses to unacceptable events are unknown and may require significant alteration of the pumping and discharge structures, quantities or locations and would therefore require reassessment.

Further assessment by DFO Science on the mitigation of risks to the aquatic environment and organisms derived from the proposed environmental effects monitoring plan would require a review of an explicit plan relative to the final configuration of the project.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity: 34  
To: Correspondence - Do not go to Macro Access Screen  
From: Action ID No.: December 19, 2007  
Document Date: December 18, 2007

Description: Received a copy of the EA Approval and covering letter. The approval contains conditions related to Fish and Fish Habitat (Section 2.0).

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\EA Approval  
File Name: Dec 18-07 EA Approval Minister Letter  
Document Type (Upload): pdf  
File Extension: pdf  
File Size: 331,092

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\EA Approval  
File Name: Dec 18-07 EA Approval  
Document Type (Upload): pdf  
File Extension: pdf  
File Size: 53,113





**Department of  
Environment & Labour**

PO Box 697  
Halifax, Nova Scotia  
B3J 2T8

*Our File Number:*  
10700-40  
40100-30-128

Office of the Minister

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*Original Dated December 18, 2007*

Mr. Scott G. McDonald, Project Manager  
Alton Natural Gas Storage LP  
PO Box 36052  
Halifax, NS  
B3J 3S9

Dear Mr. McDonald:

**Re: Environmental Assessment - Alton Underground Natural Gas Storage Project**

The environmental assessment of the proposed Alton Underground Natural Gas Storage Facility, has been completed.

This is to advise that I have approved the above project in accordance with Section 13(1)(b) of the *Environmental Assessment Regulations*, pursuant to Part IV of the *Environment Act*. I am satisfied following a review of the information provided by Alton Natural Gas Storage LP, and through the government and public consultation as part of the environmental assessment, that any adverse effects or significant environmental effects of the undertaking can be adequately mitigated through compliance with the attached terms and conditions.

This letter, in conjunction with the attached terms and conditions, constitutes my approval. This approval is subject to any other approvals required by statute or regulation, including but not limited to, approval under Part V of the Nova Scotia *Environment Act* (Approvals and Certificates section).

If you have any questions regarding the approval of this project, please contact the Manager, Environmental Assessment Branch, Ms. Lorrie Roberts via email [ROBERTLA@gov.ns.ca](mailto:ROBERTLA@gov.ns.ca)

Sincerely yours,

*Original Signed By*

Mark Parent  
Minister of Environment & Labour

Encl.

**bcc: N. Vanstone  
K. MacNeil  
L. Roberts  
W. Faulkner  
prepared by V. Margueratt**

## **Environmental Assessment Approval**

**Approval Date: Original Dated December 18, 2007**

### **Alton Natural Gas Storage Project**

**Alton Natural Gas Storage LP, Proponent  
Colchester County, Nova Scotia**

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Alton Natural Gas Storage (the "Undertaking"), proposed by Alton Natural Gas Storage LP (the "Proponent"), in Colchester County, Nova Scotia is approved pursuant to Section 13(1)(b) of the *Environmental Assessment Regulations*. This Approval is subject to the following conditions and obtaining all other necessary approvals, permits or authorizations required by municipal, provincial and federal acts, regulations, by-laws, guidelines, policies or standards before commencing work on the Undertaking. It is the responsibility of the Proponent to ensure that all such approvals, permits or authorizations are obtained before commencing work on the Undertaking.

This Environmental Assessment Approval is based upon the review of the conceptual design, environmental baseline information, impact predictions, and mitigation presented in the Registration Information.

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#### **Terms and Conditions for Environmental Assessment Approval**

##### **1.0 General Approval**

- 1.1 The Environmental Assessment Approval for the project is limited to the project as described in the registration document. Any proposal by the Proponent for expansion, modification or relocation of any aspect of the project from that proposed in the registration document must be submitted to the Environmental Assessment Branch for review and may require an environmental assessment.
- 1.2 The Proponent must, within two years of the date of issuance of this approval, commence work on the undertaking unless granted a written extension by the Minister.
- 1.3 The Proponent must not transfer, sell, lease, assign or otherwise dispose of this approval without the written consent of the Minister. The sale of a controlling interest of a business or a transfer of an approval from a parent company to a subsidiary or an affiliate is deemed to be a transfer requiring consent.
- 1.4 The Proponent must implement all mitigation and commitments in the Registration Document, unless approved otherwise by Nova Scotia Environment & Labour (NSEL).

## **2.0 Fish & Fish Habitat**

**2.1** The proponent, as part of the application for Part V Approval under the Environment Act, must provide for review the following monitoring programs and plans developed in consultation with the Department of Fisheries & Oceans (DFO). Based on the results of the monitoring programs, the proponent must make necessary modifications to mitigation plans and/or operations to prevent continues unacceptable environmental effects to the satisfaction of NSEL and DFO.

a) An Effects Monitoring Plan including parameters such as frequency and duration. The plan must evaluate potential impacts of sedimentation, salinity and flow alterations on aquatic organisms and include an impact prediction.

b) A program to monitor discharge salinity levels into the estuary to ensure no negative impacts to fish species result. This program should be developed in consultation with Environment Canada (EC).

c) A plan to gather baseline information on water temperature and the presence of Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae during one spawning season prior to the commencement of solution mining.

d) A long term monitoring program for Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae. This plan must identify operational responses to unexpected impacts to populations.

e) An ongoing monitoring program of fish screens or passive water intakes to determine if impingement is occurring.

**2.2** The proponent must maintain a minimum of 30 meter vegetated buffer between all watercourses and wetlands.

## **3.0 Archaeological & Heritage Resources**

**3.1** The proponent must develop a procedure so that any issues or concerns raised by potentially affected First Nation and Aboriginal communities, particularly related to environmental effects, can be directed to the Proponent and resolved in a timely manner. This procedure must include contact information, documentation and a resolution process.

**3.2** The proponent must develop and implement an Archaeological Contingency Plan that includes:

a) Procedures for immediate work stoppage and conservation of resources, should archaeological resources be discovered.

b) Details of worker awareness training to be delivered to employees, which will address archaeological resources and relevant procedures.

c) Plans for shovel testing to determine the presence of archaeological resources in the high potential areas identified.

d) Plans to have professional archaeologist, approved by Nova Scotia Tourism, Culture & Heritage (NSTC&H), monitor any work that would impact the dykes in case any original dyke work is encountered.

- 3.3 The Proponent must cease work and contact the Director, Heritage Division, Nova Scotia Department of Tourism, Culture and Heritage, the Executive Director, Confederacy of Mainland Mi'kmaq and the Executive Director, Union of Nova Scotia Indians immediately upon discovery of an archaeological site or artifact unearthed during any phase of the proposed project.

#### **4.0 Land Use & Public Involvement**

- 4.1 The proponent, as part of the application for Part V Approval under the Environment Act, the Proponent must provide for review and approval, a detailed of the Environmental Management Plan (EMP) including the following. Based on the results of the monitoring programs, the proponent must make necessary modifications to mitigation plans and/or operations to prevent continued unacceptable environmental effects to the satisfaction of NSEL.

a) An Environmental Protection Plan (EPP), that includes procedures to address soil management issues including mitigative strategies for reducing the risk of sedimentation and erosion, for all aspects of all phases of the project.

b) A dust management plan.

c) A Waste Management Plan (WMP).

d) An Issues Resolution System including procedures to; deal with project related complaints/issues from landowners and/or the public, to ensure complaints are recorded, tracked and resolved in a timely manner.

- 4.2 The proponent must consult with Transport Canada to determine if an application under the Navigable Waters Protection Act is required and if so, obtain such approval before commencement of site preparation and construction activities.
- 4.3 The proponent must obtain from NSDNR, any required permits for project activities pursuant to the Beaches Act and the Crown Lands Act, prior to the commencement of site preparation and construction activities.

#### **5.0 Flora & Fauna**

- 5.1 In areas where pipeline route alterations are considered, supplemental rare plant surveys must be conducted along the new route to determine if rare plants or other

sensitive habitats are present. These surveys must be provided and conducted to the satisfaction of NSDNR.

- 5.2 The proponent must implement standard mitigative measures to minimize the environmental effects of the project on plant communities including the use of native plants and/or seed mixtures free of noxious weeds and known invasive species. The proponent must use industry standards to avoid the introduction of invasive species.
- 5.3 If the undisturbed retrorse sedge habitat becomes part of the new RoW, the proponent must cordon off the area to prevent the movement of project related equipment through the habitat.
- 5.4 Clearing and grubbing must be conducted outside of the breeding season for most bird species (May 1 - August 31).
- 5.5 The proponent must not conduct project activities within 200 m of the Osprey nest identified in the field surveys during the period from April 1 to July 30.
- 5.6 The proponent must conduct a field survey prior to the commencement of construction activities to determine the size and location of the Great Blue Heron colony. Information from the survey must be sent to the Canadian Wildlife Service (CWS). The proponent must not allow project activities within a 400 m buffer zone of the rookeries from April through mid-August, any activities deemed to have a high disturbance factor within one-kilometer of the rookeries through the same period, or any activities requiring the removal of trees within the 400m buffer zone at any time of the year.

## **6.0 Groundwater**

- 6.1 The proponent, as part of the application for Part V approval under the Environment Act, must provide for review and approval:
  - a) A groundwater-monitoring program including location of monitoring wells and parameters. This program must be designed to evaluate potential impacts to both groundwater levels and groundwater quality. As a minimum, one monitoring well should be up gradient and four should be down gradient of the caverns. Wells should also be constructed down gradient from the pipeline, especially in areas where the pipeline will be closest to houses. Monitoring should include quarterly water levels and quality measurements; at a minimum one-year of baseline measurements should be collected. Based on the results of the monitoring programs, the proponent must make necessary modifications to mitigation plans and/or operations to prevent continues unacceptable environmental effects to the satisfaction of NSEL.
  - b) Details of a well survey plan of potentially at risk wells that meet NSEL standards, including water quality testing and yield determination tests.

## **7.0 Contingency Planning**

### **7.1 The proponent, as part of the application for Part V approval under the Environment Act, must provide for review and approval:**

- a) A Spill Management Plan including: measures for prevention; procedures for clean-up of any sized spill; accounting of who would be responsible for cleanup and what response and containment equipment would be available; measures for keeping birds away from a spill, and for dealing with accidents where birds are oiled and/or sensitive habitats are contaminated; reference to provincial emergency spill regulations; procedures for the storage and disposal of lubricants, petroleum products and waste oils; and reference to provincial regulations pertaining to this storage and disposal, and number and location of on site-personnel spill kits.
- b) An Emergency Response and Contingency Plan consistent in format and content with NSEL's Contingency Planning Guidelines, including:
  - i) safety features incorporated in project design,
  - ii) post accidental monitoring,
  - iii) system shut down procedures,
  - iv) notification procedures,
  - v) containment, decontamination and remediation standards to be met in clean-up,
  - vi) training and exercise drills including Workplace Hazardous Materials Information System (WHMIS) training,
  - vii) comprehensive inspection and maintenance procedures, regulatory compliance standards, reference to CSA Standard Z341 and the CAN/CSA Standard Z731-03 Emergency Preparedness and Response Standard, and
  - viii) procedures to address tourism operations on the Shubenacadie river, Cobequid and Minas Basins.
- c) Details of the Environmental, Health and Safety (EHS) system.
- d) Details for the assessment of other water uses or withdrawals, in or near the project area that could be affected by project related accidents.

### **7.2 All monitoring programs must be resubmitted over the lifetime of the project, at a schedule established by NSEL, and revised as determined by NSEL.**

*Original Signed By*

\_\_\_\_\_  
Mark Parent  
Minister of Environment and Labour

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

35  
March 04, 2008

Telephone Conversation

Action ID No.:  
Action Date:  
Document Date:

Activity:

To:  
From:

Description:

Spoke with Bob Rutherford. He is requesting a meeting with Science (Rod Bradford, Peter Amiro, Shane O'Neill), preferably next week. He would like to discuss partnering opportunities for monitoring on the Shubenacadie River in relation to the Alton Natural Gas Storage Project. He is aware that Science has put in requests for funding to conduct migration studies associated with striped bass and Atlantic salmon. There are also plans to study striped bass eggs, larval fish and juvenile fish. Reps from Alton and Jacques Whitford may attend the meeting.

The proponent has been requested to study contaminants in the sediment and fish tissue at the Alton site. Bob is not sure if there are fish that utilize the river at the Alton site that can be tested for contaminants.

Bob would to take the opportunity to discuss other monitoring items at the meeting.

Sent an email to Tana requesting the meeting with Science. Sent a second email asking for information on sampling fish tissue near the Alton site.

Action:

Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Action ID No.: 36  
Action Date: March 28, 2008  
Document Date:

Telephone Conversation

Activity:  
To  
From:

Description:

I returned a phone call from Bob Rutherford. Bob said that he was available to meet with DFO anytime next week other than Monday or Tuesday morning.

Alton is formulating their plans for this year's monitoring.

The Alton monitoring this year will run from the spring to the fall. The intensive monitoring will be in the spring through.

Alton is willing to buy some of the fish tags for the DFO studies. They would purchase 25 smolt tags (\$330 each) last about 220 days) and 16 striped bass tags (8 of which have a depth sensor and cost \$710 each; last 3-4 years). They would put three recorders out; one above the site, one at the site and one below the site. They would collect environmental data at the same time.

They will also sample for striped bass eggs and larvae. He has been in contact with Jim Dunsten. For the larvae, they would use plankton tow nets at all stages of the falling tide, sampling every hour. They have found that different organisms move through the system at different times.

To sample eggs, they will use a 1000 micron tow net, and to sample the larvae they will use a 500 micron net. A few weeks later when the juveniles are moving back through the system in the back eddies along the shore, they will use beach seine to do the sampling. When the larvae are smaller, a bug screen will be placed over the mesh. It will be removed once the larvae are larger.

Alton is presently planning to conduct the monitoring for a period of 4 years from the start of the release of the brine as the amount of discharge increases.

Once the diversion channel is constructed, sampling within the channel can take place. They may also do dye tests to see the distribution of the effluent within the channel. They may also be able to do some testing of the intake structure before it becomes operational to see if organisms are being drawn into the structure.

Action:

Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Action ID No.: 37  
Action Date: April 15, 2008  
Document Date:

Telephone Conversation

Activity:

To

From:

Description:

I returned a phone call from Virginia Soehl (she left a voice mail message on April 9, 2008). The proponent is doing the clearing work now. They need to do more geotechnical work to finalize the design of the structures by the river so they haven't applied for the industrial permit yet. They will be applying for water approvals for the work by the river and the watercrossing. We will receive copies of the information for review. NSDoE has advised that they would like them to use the dam and pump method to do the watercrossings. Virginia will check with NSDoE to see why they prefer this method. DFO always prefers directional drilling, which is how the proponent planned to do the work. The proponent would like to do the work this summer.

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

39

Activity: Correspondence - Do not go to Macro Access Screen  
To: Action ID No.:  
From: Action Date: May 15, 2008  
Document Date: May 15, 2008

Description: Letter received from Assembly of Nova Scotia Mi'kmaq Chiefs dated April 24, 2008, stating objection to Alton Gas Project. Letter dated May 15th sent from RDG to Chief Terrance Paul advising that DFO is willing to consult with First Nations once additional project details are received.

Action: Aboriginal Communications  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

40

Action ID No.:

Telephone Conversation

May 29, 2008

Action Date:

Document Date:

Activity:

To

From:

Description:

Spoke with Mark Showell. Rod advised Mark verbally that the Fish Sampling Plan proposed by Alton is acceptable. Mark is waiting to get the acceptance of the Fish Sampling Plan in writing from Rod.

Mark suggested that DFO meet with the Proponent in the summer to discuss how the sampling is progressing and what sampling should be carried out in the future.

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

41

June 19, 2008

Action ID No.:  
Action Date:  
Document Date:

Telephone Conversation

Activity:  
To  
From:

Description: Spoke with [redacted] They are going to have a bilateral with KMK and was she wondering about the status of the Alton file and Faith Scatlolon's commitment to consult once additional information was received from the proponent. I told her that we had not yet received the additional information.

Action: Information Provided s.19(1)  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Meeting  
To: 42  
From: December 05, 2008  
Document Date:

Description: Meeting - Rod Bradford, Mark Showell and Melanie MacLean  
Action: Information Provided  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\Meetings\  
File Name: Meeting-DFO-Dec 5 2008  
Document Type (Upload):  
File Extension: dot  
File Size: 208,384



## NOTE TO FILE

FILE NUMBER - NUMÉRO DE DOSSIER  
06-W7-182

CALL IN		CALL OUT		SITE VISIT		NOTE	X	TIME HEURE	DATE (Y-A - M - D-J)
NAMES OF PERSON(S) CONTACTED NOM(S) DE LA (DES) PERSONNE(S) CONTACTÉE(S)									08-12-05
Meeting – Mark Showell, Rod Bradford, Melanie MacLean									
SUBJECT - OBJECT									
Alton Natural Gas Project									
SUMMARY - RESUMÉ									
<p>Spring</p> <p>Science received SARA money to conduct studies on striped bass and Atlantic salmon smolts in the Shubenacadie River. Alton contributed to the studies. DFO used a trap net to capture fish so the transmitters could be inserted. The smolts and striped bass movements were monitored using the transmitters. Striped bass greater than 35 cm can be used. Striped bass transmitters can last for three years.</p> <p>The striped bass left Grand Lake two weeks earlier than expected (April 15<sup>th</sup>) so that study did not go as planned. DFO was not ready to operate until the first or second week of May. There were barely enough fish in the spring. DFO transmitters were used before Alton transmitters. None of the Alton striped bass transmitters were used in the spring. DFO used four hydrophones to collect data.</p> <p>Alton is welcome to use the DFO information to interpret fish movements around the Alton site.</p> <p>DFO installed the trap net again in the fall (i.e., October). The remaining DFO and the Alton transmitters were deployed. The hydrophones were pulled last week. The fish still haven't moved up the Shubenacadie.</p> <p>The purpose of the SARA project is to identify winter habitat of striped bass in Grand Lake. . A lot of small fish moved up into the lake. Didn't see any large striped bass moving up.</p> <p>There are hydrophones in Grand Lake. The trap net will go in "early" next spring. The rest of the transmitters will be used. Additional transmitters will be required.</p> <p>Rod would like to talk to Alton about this past year's study and plans for next year's assessment. Need to organize a meeting, preferably in early January to fit into Rod's schedule. Would like Alton to provide smolt transmitters, some striped bass transmitters (to top it up) and a person to work the trap net for six weeks in the spring. Perhaps Alton could also provide one or two hydrophones.</p> <p>Monitoring should take place for three years ...</p> <p>2008 – year 1 – pre-development</p> <p>2009 – year 2- development</p> <p>2010 – year 3 – operation</p>									

Alton is doing their monitoring near their site but do not have any context for the information they obtain because their study area is so small. Rod recommends that they enlarge the area that they are studying.

CONCLUSIONS - CONCLUSIONS		ACTION TAKEN - SUITE DONNÉE		ACTION REQUIRED - SUITE À DONNER	X
1) find out when Bob is available to meet in early January 2) read up on striped bass population 3) look at SARA project 4) forward data sharing agreement to Bob when I get completed form from Rod					
RECORDED BY ENREGISTRÉ PAR	NAME - NOM Melanie MacLean	DIVISION - DIVISION HPSD		TELEPHONE - TÉLÉPHONE 426-8033	



Title: PATH File No:	Shubenacadie River - water withdrawal and effluent release and natural gas storage 06-HMAR-MA7-00182
	Habitat File No: 06-W7-182

Activity:	Meeting	Action ID No.: 43
To		Action Date: January 16, 2009
From:		Document Date: January 16, 2009

Description:

Meeting Held on January 16, 2009

Meeting Attendees - Bob Rutherford (consultant for Alton), Scott McDonald (Alton Natural Gas Storage LP), Rod Bradford, Melanie MacLean

Meeting notes circulated for comment on January 30, 2009; Final Version circulated on August 12, 2009

Action:	No Change/No Action Required for this Activity	Effective Date:
		Expiry Date - HADD/Serious Harm:
		Expiry Date - Other :
		Compensation/Offsetting:
		Included in List of Records:
		Species at Risk:

Time Spent (Hrs):	0.00
Authorization Rationale:	

Directory:	W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\
File Name:	Alton Jan 16 2009 Final Notes
Document Type (Upload):	doc
	File Size: 220,672



## NOTE TO FILE

FILE NUMBER - NUMÉRO DE DOSSIER  
06-W7-182

CALL IN		CALL OUT		SITE VISIT		NOTE	X	TIME HEURE	DATE (Y-A - M - D-J)
NAMES OF PERSON(S) CONTACTED NOM(S) DE LA (DES) PERSONNE(S) CONTACTÉE(S)									09-01-16
Meeting - Bob Rutherford (consultant for Alton), Scott McDonald (Alton Natural Gas Storage LP), Rod Bradford (DFO), Melanie MacLean (DFO); Regrets – Mark Showell (DFO)									
SUBJECT - OBJECT									
Alton Natural Gas Project									
SUMMARY - RESUMÉ									
<p>Action Items:</p> <ul style="list-style-type: none"><li>Action Item - Bob will prepare a "Letter of Agreement" and forward it to Melanie for comment\signature by DFO</li><li>Action Item – Melanie will find out who in Habitat will sign the Letter of Agreement</li><li>Action Item – Rod will check with Jim Duston about historical data, concerning ecological elements of striped bass, that was collected a few years ago and may be relevant to the Alton Natural Gas Project</li><li>Action Item – Bob may also raise this with Jim to see if he plans to use this historical data</li><li>Action Item – ALTON; DFO has recommended changes to the 2009 sampling program</li></ul>									
CONCLUSIONS - CONCLUSIONS					ACTION TAKEN – SUITE DONNÉE				ACTION REQUIRED - SUITE À DONNER
RECORDED BY ENREGISTRÉ PAR	NAME - NOM			DIVISION - DIVISION				TELEPHONE - TÉLÉPHONE	
	Melanie MacLean			HPSD				426-8033	

## Data Sharing Agreement

- [REDACTED]
- The pinger data belongs to Alton Natural Gas Storage LP (ALTON) and can be shared
- There are no constraints on the operational use of the DFO data s.14(a)
- The DFO data will be joint property to be used by either party for their own purposes
- Action Item - Bob will prepare a "Letter of Agreement" and forward it to Melanie for comment/signature by DFO
- DFO Science, DFO Habitat and ALTON will sign off on the Letter of Agreement
- Action Item – Melanie will find out who in Habitat will sign the letter

## Information Gathered by ALTON

- When there are large freshets and weak tides, the water at the Alton site is fresh water
- Masters student will be meeting with ALTON in February to discuss the 2008 study

## What Regulates the Spawning Activity of Striped Bass

- Someone conducted striped bass egg sampling at Fish House and determined that spawning activity was linked to the tidal cycle (1 year of data collection), during low tides there were more eggs
- DFO did some sampling but didn't see this link, they determined that spawning was related to water temperature, striped bass spawned when temperatures reached 15\16 °C, eggs may be released for short periods of time depending on the temperature (e.g., 30 minutes)
- DFO replicated the study a second time
- This information could be used to stop the release of brine at a crucial time

## Historical Data

- Action Item – Rod will check with Jim Duston about historical data, concerning ecological elements of striped bass, that was collected a few years ago and may be relevant to the Alton Natural Gas Project
- Action Item – Bob may also raise this with Jim to see if he plans to use this historical data

## Recommendations from DFO Science to ALTON for Future Sampling

### 1) Dual Sampling

- It is important to relate the data collected at the Alton site to the larger area, therefore another location away from the site such as Fish House should be sampled.
  - **Comment from Alton on meeting notes** - There was some sampling at the Fish House last spring so they do have a feel for the differences in densities of eggs. More will be done next spring
- Mysids and zooplankton seem to come in with the tide, relate the densities of zooplankton to the flux of striped bass eggs
  - **Comment from Alton on meeting notes** - The data shows the increase in the density of the striped bass eggs with the drop in salinity and the reverse - an increase in the mysids with rising salinity on each tide. This data is being prepared for the report
- this could be labour intensive, Jim Duston could provide information on how to collect the data, need rapid estimates that are low mortality, need concurrent information over five to ten ebb tides, should be representative of seasonal variability (e.g., warm and cold days)
  - **Comment from Alton on meeting notes** - This relates to egg sampling at the spawning site and Alton sites of point 1
- at Fish House egg production is not susceptible to falling out of suspension, eggs are more channelized at Fish House while they are spread out at the Alton site
- there is a natural loss of eggs that become stranded on the tidal flats, high salinities can also kill eggs
- each striped bass population has local adaptations

2) Elvers

- elvers should be studied also, they are designated as special concern under COSEWIC
- flood tides – look at run timing of elvers
- elver behaviour is queued to the tidal cycle
- elver runs are larger a few days after ?? tide
- ??Yvonne Carrie?? with the Atlantic Elver Fishery (Halifax and Lunenburg Counties) harvests elvers using a dip net and could provide valuable information

Beach Seine Suggestions

- always sweep with the flow, go with the direction of the current
- stagger the two people so the net is in the J form
- choose sites that are consistently fishable
- there is a site just upstream from the intersection of Highway 102 and the Shubenacadie River that is good for sampling juveniles
- the Masters student should have a different seine for sampling juveniles, he could use one of Rod's seines as a template to get one made

Hydrophone

- there are benefits for Alton to have a hydrophone further downstream
- ideally a fourth hydrophone could be installed but if that is not possible one of the existing hydrophones could be moved
- there is an area towards the Maitland Bridge where it should be located

Striped Bass

- striped bass left Grand Lake before the first week of May (2008) before DFO had installed the trap net, DFO did manage to put pingers in a fair number of striped bass though, didn't use all of the Alton pingers
- DFO reinstalled the trap net in early October but the striped bass did not move out of the lake, only managed to install a few pingers
- Inserted pingers in a few juvenile striped bass
- DFO will go out next April with the trap net and insert the remaining pingers into adult striped bass
- DFO will try to top up the supply of pingers as a certain number will be lost (e.g., due to recreational fishery)
- [REDACTED] smolt study to purchase additional pingers for the striped bass

Atlantic Salmon Smolts

- ALTON would like to release and track smolts next year after the channel has been constructed
- DFO has found that there is a difference in behaviour between the wild and hatchery smolts
- Rod doesn't know if DFO will be doing more smolt studies, the smolt wheel will probably not be installed this year

Construction of the Channel

- ALTON hopes to construct the channel this fall
  - **Comment from Alton on meeting notes** - Both the intake and outfall are in the constructed channel.
- Any requirement for dredging should be minimal
- There is no need to place any structures in the Shubenacadie River
- The entrance and exit will be rip rapped

Tom Cod

- The only species that data is not being captured for is the tom cod
  - **Comment from Alton on meeting notes** - They spawn when ice conditions in the river prevent sampling.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity:

Meeting

Action ID No.: 44

Action Date:

August 11, 2009

To:

Document Date:

From:

Description:

Melanie MacLean met with Kurt McAllister and briefed him on the file. The file will be transferred to the Freshwater section. Melanie to send an email to the Centre for Science Advice advising of all the outstanding requests for information/advice and advise them that Kurt is the new contact. She will also send a letter to the proponent, ask if there are any plans available yet for the mixing channel and advise them that Kurt is the new contact for the file.

Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:



Fisheries & Oceans  
Pêches et Océans

Warning: Information in PATH may be private and/or sensitive and should not be shared without appropriate consultation and/or permission. Refer to the Data and System Security section of the PATH Helpfiles for details

Habitat Management

000078

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

46  
August 12, 2009

Action ID No.:  
Action Date:  
Document Date:

Correspondence - Do not go to Macro Access Screen

Activity:  
To  
From:

Description:

Email to Alton (cc to Rod Bradford, Kurt and province) with Jan 16, 2009 meeting notes , list for confirmation of outstanding items that Alton is waiting to hear back on, request for design plans for mixing channel and date construction is expected to start.

Information Provided

Action:

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:

0.00

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity: Correspondence - Do not go to Macro Access Screen

To:

From:

Action ID No.: 45  
Action Date: August 12, 2009  
Document Date: August 12, 2009

Description:

Email to Center for Science Advice (cc to Kurt) with list of outstanding items that Habitat is waiting for a response on.

Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Correspondence - Do not go to Macro Access Screen  
To: Action ID No.: 48  
From: Action Date: August 17, 2009  
Document Date: August 17, 2009

Description: Letter received from KMK Negotiation Office, i.e., Twila Gaudet. Letter sent in follow up to the April 24, 2008 letter that KMK sent to DFO requesting consultation on the Alton Natural Gas Project.

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Correspondence - Do not go to Macro Access Screen  
To: 47  
From: September 03, 2009  
Document Date: September 03, 2009

Description: Letter sent to proponent, Scott McDonald, requesting additional information.  
Action: Request for additional Information  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Col  
File Name: Alton Info Request-Sept 09  
Document Type (Upload): doc  
File Extension: doc  
File Size: 43,008



Fisheries and Oceans Canada · Pêches et Océans Canada

P.O. Box 1006  
Dartmouth, Nova Scotia  
B2Y 4A2

*Your file:*

September 3, 2009

*Our file:*  
06-W7-182

Mr. Scott G. McDonald, Project Manager  
Alton Natural Gas Storage LP  
PO Box 70  
Stewiacke, Nova Scotia  
B0N 2J0

Dear Mr. McDonald:

**RE: *Fisheries Act and Species at Risk Act Review, Alton  
Natural Gas Storage Project, Colchester County, Nova Scotia***

As you know, Fisheries and Oceans Canada's Habitat Protection and Sustainable Development (HPSD) Division participated in the provincial environmental assessment undertaken for the Alton Natural Gas Storage Project. Information about this development proposal is being reviewed by HPSD to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* that apply to aquatic species.

In order to continue with our review, we require details on the final design of the infrastructure that will be located beside the Shubenacadie River (e.g., mixing channel, water intake structure). Please advise when we can expect to receive this design information and also please provide details on expected timelines for construction.

Should it be determined, during the review of this information, that an authorization is required under certain sections of the *Fisheries Act* identified as Law List Regulations triggers, i.e., 35(2) and 32, DFO would have to ensure that an environmental assessment is conducted which meets the requirements of the *Canadian Environmental Assessment Act*.

The federal environmental assessment would have to be completed before the *Fisheries Act* authorization is issued. The environmental assessment process can be complex and time consuming. It might involve circulating your proposal to other relevant federal departments and making information about your proposal available to the public through the Canadian Environmental Assessment Registry (CEAR). For more information about the CEAR please visit [www.ceaa-acee.gc.ca](http://www.ceaa-acee.gc.ca).

.../2

**Canada**

- 2 -

If you have any questions or concerns, please contact Melanie MacLean at (902) 426-8033 or [macleanma@dfo-mpo.gc.ca](mailto:macleanma@dfo-mpo.gc.ca).

Sincerely,

Mike Cherry  
Regional Manager  
Habitat Protection and Sustainable  
Development Division

cc: Craig Hominick  
Bob Rutherford  
Melanie MacLean

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity:	Meeting	Action ID No.:	50
To		Action Date:	October 28, 2009
From:		Document Date:	October 28, 2009
Description:	Meeting between Melanie MacLean, Tana Worcester and Lottie Bennett to discuss status of Action Items and bring Lottie up to speed on the file. Notes on file.  Atlantic salmon contact is Jamie Gibson (Heather reports to Jamie) in PED  - Ross Claytor back as PED Section Head, Rod Bradford working with Ross on the format of the Data Sharing Agreement - Action Item for Tana - Tana will provide Data Sharing Agreement once it is available - Action Item for Melanie - Melanie to find out if they will be doing anymore baseline data collection - Action Item for Melanie - reword questions for Tana, reflect whether or not FA could be contravened, tie in provincial EA conditions - Action Item for Melanie - review email from Rod Bradford dated June 22, 2009 re: data collection		
Action:	No Change/No Action Required for this Activity	Effective Date:	
		Expiry Date - HADD/Serious Harm:	
		Expiry Date - Other :	
		Compensation/Offsetting:	
		Included in List of Records:	
		Species at Risk:	
Time Spent (Hrs):	0.00		
Authorization Rationale:			

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Correspondence - Do not go to Macro Access Screen  
To: 49  
From: September 11, 2009  
Document Date: September 11, 2009

Description: Letter sent to KMK Negotiation Office in response to their letter dated August 17, 2009.  
Action: Information Provided

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\RDG Inquiry Docket No 2009-224-00386\  
File Name: Docket No. 2009-224-00386 final  
Document Type (Upload): File Extension: doc  
File Size: 49,664



Fisheries and Oceans    Pêches et Océans  
Canada                      Canada

P.O. Box 1035  
Dartmouth, Nova Scotia  
B2Y 4T3

*Your file:*

*Our file:*  
06-W7-182

Ms. Twila Gaudet  
Consultation Liaison Officer  
Kwilmu'kw Maw-klusuaqn Negotiation Office  
851 Willow Street  
Truro, Nova Scotia  
B2N 6N8

Dear Ms. Gaudet:

**RE:    Alton Underground Natural Gas Storage Project, Nova Scotia**

Thank you for your letter dated August 17, 2009 (attached). As you know, Fisheries and Oceans Canada (DFO) participated in the provincial environmental assessment (EA) undertaken for the Alton Natural Gas Storage Project. DFO's role in the assessment was to provide advice to the province in relation to fish and fish habitat. At the same time, DFO reviewed the EA information to assess whether the project, as proposed, would likely result in impacts to fish and fish habitat which would be prohibited by the habitat protection provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* (SARA) that apply to aquatic species.

The proponent received a provincial EA approval on December 18, 2007. Since that time, DFO has continued to work with the province and the proponent in regards to fulfilling the provincial EA conditions related to fish and fish habitat contained in the approval. These conditions relate to baseline data collection and monitoring. DFO has also continued to review new information on the project as it becomes available.

DFO is still waiting for the proponent to provide details on the final design of the infrastructure that will be located along the Shubenacadie River (e.g., the mixing channel, the water intake structure). It is our understanding that these details have not yet been finalized. Once this information has been received, DFO should have enough information to make a final determination on whether any approvals/authorizations will be required under the *Fisheries Act* or SARA. DFO would then be in a position to have a meaningful discussion with the KMK Negotiation Office about the implications of this project on fish and fish habitat.

.../2

**Canada**

- 2 -

If it is determined that no *Fisheries Act* or SARA approvals/authorizations are required, DFO will continue to work with the province and the proponent to ensure adequate monitoring is conducted for the protection of fish and fish habitat.

If you have any questions or concerns, please contact Melanie MacLean at (902) 426-8033 or [macleanma@dfo-mpo.gc.ca](mailto:macleanma@dfo-mpo.gc.ca).

Yours sincerely,

Faith G. Scattolon  
Regional Director-General  
Maritimes Region

Attachment

cc: Deputy Minister Nancy Vanstone  
Vanessa Margueratt  
Jay Hartling  
Denise McCullough  
Scott McDonald  
Melanie MacLean

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Meeting  
To: 51  
From: November 12, 2009  
Description: November 12, 2009  
Action: Action ID No.:  
Effective Date: November 12, 2009  
Expiry Date - HADD/Serious Harm: November 12, 2009  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Description: Meeting with Melanie MacLean, Lottie Bennett, Scott MacDonald and Bob Rutherford. Notes on file.  
Action: No Change/No Action Required for this Activity  
Time Spent (Hrs): 0.00  
Authorization Rationale:



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

52

Action ID No.:  
Action Date:  
Document Date:

Telephone Conversation

Activity:

To:

From:

Description:

Spoke with Bob Rutherford. Landis has been bought out by AltaGas Income Trust so AltaGas and Fort Chicago Energy Partners LP are now partners for this project.

The intended plans for moving forward are:

summer 2010 - construct the pipeline  
late fall 2010 - construct the infrastructure by the river  
next spring (2011) - start the operation to remove salt from the caverns

Bob would like to schedule a meeting for later this month. He has responses to the provincial EA questions which he will forward to me and we can discuss at the meeting.

Action:

Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Meeting  
To: 53  
From: April 26, 2010  
Description: Action ID No.:  
Action Date:  
Document Date:

Description: Meeting held on Alton Natural Gas Storage Project. Attendees included Scott McDonald, Bob Rutherford, Lottie Bennett and Melanie MacLean. Notes of the meeting are on file.

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Site Visit  
To: 54  
From: June 28, 2010  
Action ID No.:  
Action Date:  
Document Date:

Description: Visited the site where the mixing channel will be constructed with Scott MacDonald, Bob Rutherford and Lottie Bennett. Stacey Nurse and Lisa Paon attended as well. Photos and videos were taken by Lisa and Stacey. Two video clips have been linked and some photos have been uploaded and can be viewed under Pictures.

Action: Information Received  
Time Spent (Hrs): 0.00  
Authorization Rationale:

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\Site Visits\Photos June 2010 (Lisa)\  
File Name: Alton June 2010  
Document Type (Upload): avi  
File Extension: 18,834,472  
File Size:

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\Site Visits\Photos June 2010 (Lisa)\  
File Name: Alton 2 June 2010  
Document Type (Upload): avi  
File Extension: 25,012,184  
File Size:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

64

July 19, 2010  
July 19, 2010

Action ID No.:  
Action Date:  
Document Date:

Correspondence - Do not go to Macro Access Screen

Activity:  
To  
From:

Description:

Data Agreement, for sharing of DFO data with Alton, signed off by Alton on July 19, 2010.

Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

59

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

July 29, 2010

To:

Action Date:

From:

Document Date:

July 29, 2010

Description:

Data Agreement, for sharing of Alton data with DFO, signed off by DFO on July 29, 2010.

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

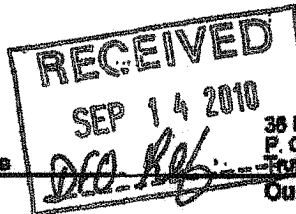
Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Note to File  
To: 55  
From: September 17, 2010  
Description: Approval 2008-061384 Rcv'd. Approval letter linked  
Action: Information Received  
Effective Date: September 14, 2010  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\ Approval 2008-061384  
File Name: pdf  
Document Type (Upload): File Extension: File Size: 1,301,154

**NOVA SCOTIA**  
**Environment**  
Environmental Monitoring and Compliance



35 Ingle Place  
P. O. Box 824  
Truro NS B2N 5G6

Tel: (902) 893-5880  
Fax: (902) 893-0282

Our File Number: 92100-30-TRU-2008-061384A01

June 12, 2008

Mr. Scott McDonald  
Alton Natural Gas Storage LP  
PO Box 36052  
Halifax, NS  
B3J 3S9

**FAX**



*Michelle MacLean*  
*426-1489*



*Vanessa Margueratt*

*15*

DATE: *Sept 14/10*



Dear Mr. McDonald:

**RE: Approval to Construct and Operate - Brine Storage Pond - Phase II Site  
Preparation and Well Drilling  
Approval No. 2008-061384 A01, PID # 20070660**

Enclosed please find Approval # 2008-061384 A01 to construct and operate the Brine Storage Pond, Phase II Site Preparation and Well Drilling, at Alton, Colchester County, Nova Scotia.

Strict adherence to the attached terms and conditions is imperative in order to validate this approval.

Despite the issuance of this Approval, the Approval Holder is still responsible for obtaining any other authorization which may be required to carry out the activity, including those which may be necessary under provincial, federal or municipal law.

Should you have any questions, please contact Samantha Leger, Northern Region, Truro Office at (902) 893-5880.

Yours truly,

Wayne Faulkner  
District Manager

cc Vanessa Margueratt, Environmental Assessment Officer  
Samantha Leger, Inspector  
Rod MacLennan, P. Eng.  
Chris O'Connell, Inspector

Elmas #: 2008-061384

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Note to File  
To: 56  
From: September 17, 2010  
Description: Action ID No.:  
Action Date:  
Document Date:

From: XMAR, Referrals-Maritimes  
Sent: September 17, 2010 2:42 PM  
To: MacLean, Melanie A (Habitat)  
Subject: 06-HMAR-MA7-00182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co

Hi Melanie,

Approval has been linked. I'll pass you the original faxed copy for the file.

<<file:\\W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\Approval 2008-061384.pdf>>

Please review this information carefully

If you receive this information in error and needs to be reassigned please advise me ASAP

Thank you / Merci

*Referrals Clerk / Commis, Projets référés*

Tel/ Tél: (902) 426-3909 Fax / Téléc: (902) 426-7174

Email / courriel: [ReferralsMaritimes@dfo-mpo.gc.ca](mailto:ReferralsMaritimes@dfo-mpo.gc.ca) <<mailto:ReferralsMaritimes@dfo-mpo.gc.ca>>

Do you really have to print this message? Let's think of the environment.  
Devez-vous vraiment imprimer ce courriel? Pensons à l'environnement.



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Action:	No Change/No Action Required for this Activity	Effective Date:
		Expiry Date - HADD/Serious Harm:
		Expiry Date - Other :
		Compensation/Offsetting:
Time Spent (Hrs):	0.00	Included in List of Records:
Authorization Rationale:		Species at Risk:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

57

Activity:

Action ID No.:

Correspondence - Do not go to Macro Access Screen

November 05, 2010

To

McDonald, Scott

Action Date:

Fleming, Melanie

Document Date:

November 05, 2010

From:

Description:

Provided LOA (includes four attachments) to Proponent. Letter as follows:

Habitat Protection and Sustainable Development Division

P.O. Box 1006

Dartmouth, Nova Scotia

B2Y 4A2

Your file

Votre référence

November 5, 2010

Our file

Notre référence

Mr. Scott McDonald

06-HMAR-MA7-00182

Alton Natural Gas Storage LP

P.O. Box 70

Stewiacke, Nova Scotia

B0N 2J0

Dear Mr. McDonald:

RE: Fisheries Act Review, Development of Natural Gas Storage Caverns, Shubenacadie River, Colchester County, Nova Scotia

Fisheries and Oceans Canada (DFO) - Fish Habitat Management Program was first advised of your proposal to develop an underground storage facility for natural gas near Alton, Nova Scotia on August 11, 2006. Please refer to the DFO file number and title below:

DFO File No.:

06-HMAR-MA7-00182

Title:

Shubenacadie River - water withdrawal and effluent release and natural gas storage

Proposal information was initially received by DFO as part of the Nova Scotia Environmental Assessment process. After the Nova Scotia Environmental Assessment Approval was issued, the information related to the proposal was received directly from you. This information has been reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the Habitat Protection Provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* that apply to aquatic species.\*

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

The proposal information that was reviewed by DFO includes the following:

- Draft Report - Environmental Registration for the Proposed Alton Natural Gas Storage Project dated April 16, 2007
- Final Report - Environmental Registration for the Proposed Alton Natural Gas Storage Project dated June 14, 2007
- Supplemental Information to the Environmental Registration for the Proposed Alton natural Gas Storage Project dated November 23, 2007
- Alton Gas - Aquatic Environment Discussion Paper, Draft, Dated January 24, 2007
- Shubenacadie River Facilities Intake/Outlet Structure and Pre-Mixing Pond - Option 3, Draft Conceptual Design Only, dated February 27, 2007
- Striped Bass Egg and Larvae Monitoring Proposal in the form of a letter to Dr. Rod Bradford dated May 16, 2007
- Draft - Plan of Mixing Channel (Figure 1) by Matrix Solutions Inc. dated September 29, 2010
- Draft - Mixing Channel Profile and Cross Section (Figure 2) by Matrix Solution Inc. dated September 29, 2010
- For Information Only - Alton Salt Cavern Storage Project, Water Intake Facilities, Water Intake Skid Location, Plot Plan dated August 11, 2008, Revision A2

A description of the development proposal is included in Attachment 1. Please note that this letter of advice pertains to the works and undertakings located in close proximity to the Shubenacadie River including water withdrawal and brine release. This letter does not include a consideration of potential impacts of the watercrossings associated with the pipeline between the Shubenacadie River and the storage facility. Once details of the watercrossing methodology have been finalized, it is recommended that you consult with DFO Habitat Management Program for additional advice.

Inner Bay of Fundy Atlantic Salmon, which are currently listed as Endangered in Canada under the *Species at Risk Act*, are believed to use the area near the site of the proposed mixing channel, and have therefore been considered as part of this assessment. If you would like more information about this species, please visit the *Species at Risk Act*

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Public Registry at [www.sararegistry.gc.ca](http://www.sararegistry.gc.ca) <<http://www.sararegistry.gc.ca>>. Additionally, the Committee on the Status of Endangered Wildlife in Canada has listed Striped Bass (Southern Gulf of St. Lawrence population) as Threatened, and American Eel as Special Concern.

To reduce potential impacts to fish and fish habitat, we are recommending that the mitigation measures in Attachment 2 be considered in relation to the proposed work.

DFO participated in the Nova Scotia Environmental Assessment of this development proposal. A condition of the provincial Environmental Assessment Approval dated December 18, 2007 (specifically Section 2.1), related to fish and fish habitat, stipulates that the Proponent must provide monitoring programs and plans to NSEL (now Nova Scotia Environment (NSE)) and DFO, for review. Also, based on the outcome of the monitoring program, the Proponent must make modifications to mitigation plans and/or operations to prevent any unacceptable environmental effects. The exact wording of this section of the provincial Environmental Assessment Approval is provided in Attachment 3.

Taking into consideration both the monitoring requirements contained in the provincial Environmental Assessment Approval and the legislation for which DFO has responsibility, a monitoring program was developed in consultation with you. Details of this program are contained in Attachment 4. The monitoring program may need to be revised as additional information is collected.

Provided that the additional mitigation measures, and the monitoring, in Attachments 2 and 4, are included in your plans, DFO Habitat Management Program has concluded that your proposal is not likely to contravene the Habitat Protection Provisions of the *Fisheries Act* or the *Species at Risk Act*. Therefore, you will not need to obtain a formal approval from DFO in order to proceed with your proposal.

Please notify this office at least 10 days before starting the construction work beside the Shubenacadie River. A copy of this letter should be kept on site while the work is in progress. If the plans have changed or the description of your proposal is incomplete or erroneous, you should contact this office to determine if the advice in this letter still applies

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Please be advised that any impacts to fish and fish habitat which result from a failure to implement this proposal as described or incorporate the additional mitigation measures and monitoring included in this letter could lead to corrective action such as enforcement. If you have any questions, I can be contacted at our Dartmouth office at 902-426-8033, by fax at 902-426-1489, or by email at [melanie.a.maclean@dfo-mpo.gc.ca](mailto:melanie.a.maclean@dfo-mpo.gc.ca).

Yours sincerely,

Melanie MacLean  
Habitat Assessment Biologist

#### Attachments

cc: Craig Hominick (DFO, Area Habitat Coordinator)  
Kristian Curran (DFO, Centre for Science Advice)  
Rod Bradford (DFO, Science Branch)  
Vanessa Margeurett (Nova Scotia Environment, Regional Office)  
Wayne Faulkner (Nova Scotia Environment, District Office)

#### Action:

Advice - Letter of Advice to Proponent F/A 35(1)

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:

0.00

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
 PATH File No: 06-HMAR-MA7-00182  
 Habitat File No: 06-W7-182  
 Receive Date: 2006/08/11

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\LoA\

File Name: 06-W7-182 Alton-Attach 1-Project Description  
 Document Type (Upload): File Extension: doc  
 File Size: 29,184

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\LoA\

File Name: 06-W7-182 Alton-Attach 3-Provincial Conditions  
 Document Type (Upload): File Extension: doc  
 File Size: 26,624

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\LoA\

File Name: 06-W7-182 Alton-Attach 4-Monitoring  
 Document Type (Upload): File Extension: doc  
 File Size: 50,176

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\LoA\

File Name: 06-W7-182 Alton-Attach 2-Mitigation  
 Document Type (Upload): File Extension: doc  
 File Size: 31,232

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\LoA\

File Name: 06-W7-182 Alton-LoA-Nov 2010  
 Document Type (Upload): File Extension: doc  
 File Size: 56,832

## **Attachment 1**

### **Description of the Alton Natural Gas Storage Project**

Alton Natural Gas Storage Limited Partnership is proposing to develop an underground natural gas storage facility in a series of engineered salt caverns near Alton, Nova Scotia. The proposed development project is initially intended to help manage the supply of natural gas in eastern Canada and the United States and may also be used for the storage of other substances such as compressed air. The project will consist of multiple caverns developed by solution mining in underground salt deposits. Solution mining is the process where water is used to dissolve salt deposits to form caverns, which can then be used as storage facilities. These salt deposits are natural geological formations located at depths of over 700 meters (m). The caverns and their accompanying facilities will be capable of storing billions of cubic feet of natural gas produced during peak production/low demand periods and delivering it back to the gas pipeline system during periods of supply deficits.

Key Project features include:

- The natural gas storage facility near Alton
- Buried pipelines between the storage facility and the Shubenacadie River; these pipelines will be used to transport water from the river to the facility to be used in the solution mining process and for transporting the brine water back to the river
- A brine solution holding pond near the Shubenacadie River
- A mixing channel and water intake structure located on the bank of the Shubenacadie River approximately 12 kilometers from the storage facility

Initially, four caverns of approximately 226,000 cubic meters (60 m diameter by 80 m in height) will be formed over 18 to 24 months, with construction commencing potentially in early 2011. Depending on future market demand, as many as 10 to 15 caverns may be developed at a later date. If so, brining and gas storage operations may operate concurrently as additional caverns are developed.

**Attachment 2**  
**Alton Natural Gas Storage Project**  
**List of Mitigation Measures**

- The design of the mixing channel and the construction methodology should be selected so as to minimize disturbance to the shore of the Shubenacadie River.
- Work below the ordinary high water mark should be planned around the tide cycle to minimize work in the water.
- All work should be carried out in a way that minimizes both the disruption of sediment on the bed of the Shubenacadie River and the movement of sediment into the river.
- Construction work along the shore of the Shubenacadie River should be carried out to avoid periods when fish, as defined in the *Fisheries Act*, could potentially be adversely impacted by the work (e.g., avoid the time period when Striped Bass eggs and larvae could be found at the site).
- The soil at the outlet and inlet to the mixing channel should not be removed until all construction related to the mixing channel has been completed (i.e., the mixing channel should be constructed in the dry) including stabilization of the bed and banks of the channel.
- Any rock to be used in stabilization of the mixing channel should be clean, durable, non-ore bearing, non-toxic and obtained from a non-watercourse source.
- All excavated material should be placed in an area where it will not enter any watercourse.
- Equipment used in the project should be clean, in good repair and not leaking fuel, oil, grease or lubricant.
- A suitable emergency response kit should be kept on-site during construction to deal with the accidental releases of hazardous substances. All accidental releases should be reported to the 24 hour environmental emergencies number (1-800-565-1633).
- Every effort should be made to ensure that there is no discharge of any harmful material into the river during construction.
- Any fuelling of equipment should take place well away from the shore of the river.
- No blasting should take place without prior approval of Fisheries and Oceans Canada.



**Attachment 3**  
**Nova Scotia Environmental Assessment Approval**  
**Fish and Fish Habitat Conditions**

**2.0 Fish & Fish Habitat**

- 2.1 The proponent, as part of the application for Part V Approval under the Environment Act, must provide for review the following monitoring programs and plans developed in consultation with the Department of Fisheries & Oceans (DFO). Based on the results of the monitoring programs, the proponent must make necessary modifications to mitigation plans and/or operations to prevent continues unacceptable environmental effects to the satisfaction of NSEL and DFO.
- a) An Effects Monitoring Plan including parameters such as frequency and duration. The plan must evaluate potential impacts of sedimentation, salinity and flow alterations on aquatic organisms and include an impact prediction.
  - b) A program to monitor discharge salinity levels into the estuary to ensure no negative impacts to fish species result. This program should be developed in consultation with Environment Canada (EC).
  - c) A plan to gather baseline information on water temperature and the presence of Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae during one spawning season prior to the commencement of solution mining.
  - d) A long term monitoring program for Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae. This plan must identify operational responses to unexpected impacts to populations.
  - e) An ongoing monitoring program of fish screens or passive water intakes to determine if impingement is occurring.
- 2.2 The proponent must maintain a minimum of 30 meter vegetated buffer between all watercourses and wetlands.

**Attachment 4**  
**Alton Natural Gas Storage Project**  
**Effects Monitoring Related to Fish and Fish Habitat**

<b>Monitoring Parameter</b>	<b>Water Intake Structure</b>	<b>Location of Data Collection</b>	<b>Shubenacadie River</b>
Water Quality - salinity		<p><b>Mixing Channel</b></p> <p>Brine discharge operations will be adjusted to meet the river salinity standards being monitored.</p> <p>Flow rate in the mixing channel is 898 parts river water to 1 part brine on the ebb tide.</p> <p>Salinity will be measured on the bottom of the channel on both sides of the outfall array at 5 m from the rock cover and at the channel outlets to the river using CTD data loggers at 10-minute intervals.</p> <p>It is expected that the turbulence in the channel will fully mix the brine in the water column. This will be confirmed by tests during early brining operations by CTD data loggers set vertically on a pole at the top of the array rock at 2 m intervals to get salinity readings in the water column.</p> <p>Salinities at the channel entrances will be kept at or below 7 ppt or within 10% of background whichever is greater. This is well within the tolerances of all species present and not above changes they would experience as the tidal bore passes.</p> <p>In-channel salinities are not expected to exceed 11 ppt or 10% above background, whichever is greater in any area accessible to the fish or eggs. This is within tolerance limits of all species for short duration exposure. This will be monitored by the in-channel CDT probes.</p> <p>During operation, background salinities will be the salinities at the intake to the channel.</p>	<p>Further mixing in the turbulent estuary will lower these levels to background very quickly. Salinity levels will be checked to ensure they have not been increased above the tolerance levels of the aquatic species present on the various stages of the tide.</p>

**October 7, 2010**

**Page 1**

000107

Monitoring Parameter	Location of Data Collection		
	Water Intake Structure	Mixing Channel	Shubenacadie River
Water Quality - currents	<p>Velocities will be measured across as well as into the face of the water intake.</p> <p>It is expected that the velocities into the intake will be very low reaching a maximum at low tide of 0.02 m/sec. There will be a stronger "net flow in" as the tidal bore fills the intake area and a "net flow out" during falling tides. These calculations will be confirmed by measurements if possible. These very low velocities into the intake combined with the higher velocities and turbulent currents across the face of the intake may not result in reliable readings of the intake velocities. If there are velocities of concern to the fish, they will be measurable.</p>	<p>14% of the river flow will be diverted into the mixing channel. Water withdrawal into the intake will be 0.15 m<sup>3</sup>/sec. Most of the withdrawn water will be returned to the river 60 m away. There will not be a measurable change in flows in the mixing channel.</p>	<p>The change in flow in the estuary is not significantly different. There may be a slight build up of the mud flat on the opposite side of the estuary but this bar changes now with the various flows and does not have any infauna. In this dynamic reach of the river, the changes in current patterns due to the channel and operations become insignificant.</p>
Water Quality - temperature		<p>The question of water temperature was addressed in the supplemental appendix H. It is concluded that the return water will be at seasonal mean temperatures. Discharge dilution will bring any minor temperature differences to ambient very quickly.</p> <p>The CTD's, as in the salinity section, will give water temperatures in the mixing channel.</p> <p>Regarding the monitoring of water temperature in association with the presence of Striped Bass eggs and larvae, the Proponent will have 3 years of pre-operation monitoring of water temperatures and the presence of</p>	

Monitoring Parameter	Location of Data Collection		Shubenacadie River
	Water Intake Structure	Mixing Channel	
		Striped Bass eggs and larvae at the site. This will be used to predict the possibility of their presence in future years. Monitoring will be done on an ongoing basis and certainly when the eggs and larvae are present. The concern over temperature shock or high temperature over 24°C are not founded as there is no temperature difference due to the discharge.	
Water Quality – dissolved oxygen		Nitrogen used for cavern development will be removed from the brine water using a nitrogen separator, prior to entering the brine return lines.  Oxygenation will be done using a control valve and flow rate meter, in the piping between the Brine Retention Pond and the Mixing Channel, which will allow for a controlled volume of air injection to this stream. Excess air will bubble from the brine distribution piping in the Mixing Channel as was described in supplemental Appendix I.	
Water Quality – suspended sediment		No increase is possible from the operations.	
Sedimentation		The sediment transport in the estuary is huge. The small amount of sediment discharged from the Alton operation is not significant and is just returning sediment withdrawn from the system. All organisms in the environment are well adapted to high sediment loading and extreme sedimentation. Any remaining sediment entering and returning from the caverns will settle out in the brine pond. Sediment returned to the mixing channel will be only the mud and sand fraction picked up by the pumps. Return maintains the balance of sediment load.  The Proponent should initially report on the sediment infill rates for the mixing channel to confirm that sediments are not being carried into the mixing channel and deposited.	

Monitoring Parameter	Location of Data Collection		
	Water Intake Structure	Mixing Channel	Shubenacadie River
Channel Morphology			If deemed necessary in the future, the Proponent may be required to conduct monitoring to assess changes to channel morphology. Monitoring could include conducting repeated air photo surveys.
Fish – General and Special Status Species (Special status species include Atlantic Salmon, American Eel, and Striped Bass)	<p>Observations will be made but the high turbidity prevents seeing the fish. Velocities into the intake structure will be very low (less than 0.02 m/sec) and a net outflow will dominate during falling tides. Impingement is not possible for live fish.</p> <p>Water samples will be withdrawn from in front of the water intake and filtered through a plankton net to estimate the numbers of eggs and larval fish that come under the influence of the intake flows. Samples will also be withdrawn from the wet well to determine what proportion are taken in and come under the influence of the pump intakes. If this is significant, samples will also be taken in the sediment discharge water to determine survival and the proportion removed by the sand removal centrifuge. May through to mid July during all brining operation years.</p>	<p>Egg, larval fish and mysid samples will be withdrawn from either side of the outfall dispersion rock. The samples will be analyzed for survival rates but there is mortality due to sampling which will have to be taken into account.</p> <p>Acoustically tagged smolt and Striped Bass will be monitored for use of the mixing channel.</p> <p>If the start up date is several months before or after the late winter/spring "fish eggs and larvae" period then the Proponent will be able to monitor the intake and outfall water quality for several months prior to the arrival of late winter/spring fish eggs and larvae. This will allow operations to be adjusted to ensure protection. If the start up date is during this period, brine releases can be timed to occur when the estuary is of high salinity while tests are run to confirm the dilution during freshwater periods when the eggs and larvae are present in high numbers. Brine production on start up is very small and can easily be accommodated in this way.</p>	<p>The changes in salinity at the entrances to the mixing channel are very small and well within the tolerances of the fish. Observations will be made of the acoustic tagged smolt and any acoustic tagged Striped Bass to determine their use of the mixing channel. Samples of the eggs/larvae and mysids taken in the channel (as above) will be assessed for mortality due to salinities.</p> <p>The high turbidity of the water in this section of the estuary make visual observations impossible.</p>

No information removed

**Pages 112 to / à 114**

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Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

60  
February 01, 2011

Activity: Correspondence - Do not go to Macro Access Screen  
To: Action ID No.:  
From: Action Date:  
Document Date:

Description: DFO tagging data provided to Alton as per data agreement.  
Action: Information Provided

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale: 0.00



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HIMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

61

Activity: Correspondence - Do not go to Macro Access Screen  
To: Action ID No.:  
From: Action Date: March 15, 2011  
Document Date:

Description: Alton tagging data provided to DFO as per data agreement. Some data not yet available and will be forwarded at a later date.  
Action: Information Provided

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

63

March 21, 2011

Action ID No.:

Correspondence - Do not go to Macro Access Screen

Activity:

Action Date:

To

From:

Description:

Bob Rutherford faxed over a copy of this year's DFO license that Jim Duston receives automatically every year for work on the Stewiacke and Shubenacadie Rivers as well as last year's license for the monitoring associated with the Alton project. They would like the license to be expanded to include monitoring in the tidal portion of the Shubenacadie River rather than just the area next to the location of the mixing channel.

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Action ID No.: 62  
Action Date: March 21, 2011  
Document Date: March 21, 2011

Activity: Meeting

To:  
From:

Description:

Meeting held between Alton (Scott McDonald and Bob Rutherford) and DFO (Melanie MacLean). Alton provided information on the status of the project and monitoring work planned for this year. They are still trying to get a license from DFO in order to carry out the monitoring work. Jim Duston and Rod Bradford will be meeting in early April to discuss.

Meeting notes are on file.

Action: Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

65

June 28, 2011

Action ID No.:  
Action Date:  
Document Date:

Site Visit

Activity:  
To  
From:

Description:

Attendees:  
Students - Gina Stewart and Robert  
NS Agr. College - Jim Duston  
Consultant - Bob Rutherford and assistant  
Proponent - Scott McDonald  
DFO - Melanie MacLean

Visited the site to see how baseline data was being collected. Students were dragging the plankton tow by boat while travelling downstream into the flood tide. They also measured water velocity. They are focussing on collection of Striped Bass eggs and larvae. They have four sites along the shoreline where they seine also. They also do plankton tows during the ebb tide. Sometimes (during heavy spawning events) they take samples over a long time period of time (e.g., 24 hours).

Bob Rutherford and his assistant were pumping water from the river into a net to collect samples also. This system doesn't appear to hurt Striped Bass eggs and larvae.

Rough notes from site visit are on the hard copy file.

Action:  
Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

68

Activity: Correspondence - Do not go to Macro Access Screen  
To: Action ID No.:  
From: Action Date:  
Document Date:

March 08, 2012  
March 08, 2012

Description: Received a copy of the 2011 annual report and the 2012 work plan from Bob Rutherford.  
Action: Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Directory: W:\Referrals and EA's\2006 Referrals and EA's\Nova Scotia\Colchester County\06-W7-182 Shubenacadie River - water withdrawal and effluent release and natural gas storage , Colchester Co\Alton -2012 Plans\  
File Name: Final Report 2011+Work Plan 2012  
Document Type (Upload):

File Extension: msg  
File Size: 1,210,368

**Stevens, Farrah**

---

**From:** Bob Rutherford [REDACTED]  
**Sent:** Thursday, March 8, 2012 10:31 AM  
**To:** MacLean, Melanie A (Habitat)  
**Subject:** RE: Alton Gas  
**Attachments:** 2012AltonShubieWorkPlanupdateFeb10 (2).docx;  
2011annualreportUpdateFeb23FINAL.pdf

Here are the Alton work plan for 2012 and the final report for 2011

[REDACTED] Scott can answer any of your questions

Bob Rutherford  
[REDACTED]

-----Original Message-----

**From:** MacLean, Melanie A (Habitat) [mailto:Melanie.A.MacLean@dfo-mpo.gc.ca]  
**Sent:** Wednesday, March 07, 2012 7:44 AM  
**To:** Bob Rutherford  
**Subject:** RE: Alton Gas

Thanks Bob. Sounds good.

Melanie

-----Original Message-----

**From:** Bob Rutherford [REDACTED]  
**Sent:** March 6, 2012 7:58 PM  
**To:** MacLean, Melanie A (Habitat)  
**Subject:** RE: Alton Gas

[REDACTED] Rod decided not to meet

I will send you last year's final report and the work plan for 2012 in a couple of days when they are updated.

After that you can decide if you want Scott and I to come in a go over things.

Still no firm date on when they will build but the deal with NSAC is for 2 more years.

Bob Rutherford  
[REDACTED]

-----Original Message-----

From: MacLean, Melanie A (Habitat) [mailto:Melanie.A.MacLean@dfo-mpo.gc.ca]  
Sent: Tuesday, March 06, 2012 8:20 AM  
To: Bob Rutherford  
Subject: RE: Alton Gas

Thanks Bob. Let me know when\if it is going to happen. I'm away at meetings next week (March 12-16).

Other than that, I'm here.

Melanie

-----Original Message-----

From: Bob Rutherford  
Sent: March 5, 2012 7:13 PM  
To: MacLean, Melanie A (Habitat)  
Subject: FW: Alton Gas

Rod has not replied about having the meeting tomorrow so I guess it is off.

Bob Rutherford

-----Original Message-----

From: Bob Rutherford  
Sent: Monday, February 20, 2012 8:53 AM  
To: 'MacLean, Melanie A (Habitat)'  
Subject: RE: Alton Gas

Here is a draft work plan to date -- these are the NSAC suggestions and Alton hasn't commented yet -- but it gives you a ball park and if there are other things you would like to see now is a good time to add them.

It seems to me that Connie will send you the licence application as she did last year. I think that is because Rod asks her to in his comments and based on the meeting last month he will do the same this year

Bob Rutherford

-----Original Message-----

From: MacLean, Melanie A (Habitat) [mailto:Melanie.A.MacLean@dfo-mpo.gc.ca]  
Sent: Monday, February 20, 2012 8:19 AM  
To: Bob Rutherford  
Subject: RE: Alton Gas

Hi Bob. Thanks for the update and report. We just had our first round of cuts last week. Besides all the terms, there are four full time people in the branch losing their jobs [REDACTED] That's on top of retirements and deployments.

I believe there will be a reorganization within Habitat Management Division soon but in the meantime I will assume that I'm still on the Alton file. I will look into this though. If the file is going to change hands, it would be nice to have that person at the meeting on March 6th.

I certainly would like to attend March 6, 2012 meeting. There is a presentation that afternoon from 1:30 - 3:30 pm on the new DFO Values and Ethics Code for the Public Sector but it is not imperative that I attend.

I'm certainly supportive of issuing the sampling license. I'm still not clear on the process. Will the draft license be sent to me from Connie Farr for input or will it just go to Science? If it isn't coming to me, it might be good for Alton to send a copy of the proposed sampling plan directly to me. I would like to run it by Kurt McAllister as Head of the Freshwater Protection Section before I provide any official feedback.

I hope everything is going well for you and you find some time for a vacation every now and then. Have a great day.

Melanie

>Melanie MacLean (Habitat)

>FCSAP Coordinator/HMP SARA Coordinator

Habitat Management Division | Division de la gestion de l'habitat Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada

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Tel | Tél: (902) 426-8033 Fax | Téléc: (902) 426-1489

Email | Courriel: melanie.a.maclea@df-mo.gc.ca

>

-----Original Message-----

From: Bob Rutherford [REDACTED]

Sent: February 19, 2012 11:22 AM

To: MacLean, Melanie A (Habitat)

Subject: RE: Alton Gas

Hi Melanie

Are you still on the Alton file?

Attached is the report from last summer's work and there is a proposal being drafted, in consultation with Rod Bradford, for studies this coming spring.

Right now it looks like Alton Gas will begin construction at the river site sometime in the late summer or fall (a moving target) so we have one more year of background studies. This is a very complex site and still lots to learn especially how the eggs and larvae hold in the river and how they use the shallows. We are also coming closer to figuring out the abundance of the spawning and natural mortality rates that will put any losses due to the Alton operations in context. It is still likely they will just shut down if they are affecting many young bass.

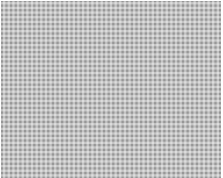


There is a proposed meeting on March the 6th at BIO and you are welcome to come. I will send more information as the details are available.

Jim will be applying for another sampling licence and again Rod questioned if habitat would be supportive of more studies. As far as I can see the more that we can learn about the Bass the better from both a pure science perspective and well as environmental assessment of this and upcoming developments.

Hope things are good with you

Bob Rutherford  
Thaumas Environmental Consultants Ltd.



**2012 Proposed Work Plan****Alton Gas Natural Gas Ltd. : Shubenacadie Estuary**

Update Feb 10

**Labour requirements.** Budget for two years.

1. **Gina Stewart:** Provides essential continuity. [REDACTED]

2. **MSc student.** Requires two years funding. [REDACTED]

3. **Undergraduate summer student.** R. Schicht filled this position 2010-11. [REDACTED]

4. **J. Duston.** General supervision, report preparation, and participates in field sampling as needed.

**Proposed work plan 2012** (2013 work plan largely dependent on 2012 outcomes of field work and whether or not construction commences)

1. **Egg production of adult female striped bass.**

April-May 2012: Collaborate with drift-net fishermen to obtain carcasses from between 10 to 15 pre-spawned 'keeper' fish >68cm TL. Record body size, extract ovaries and determine fecundity per fish. Also extract scales and otoliths for aging. Adds to 2011 fecundity data from 16 adult females all >68cm TL (scales and otoliths archived). Also have archived scales and some otoliths from angled fish caught 2009-2010.

2. **Temperature, salinity, water velocity, water height**

**Temperature and salinity:** April-October 2012: Deploy CTD probe at Alton site by May 1 (Bob Rutherford). A CTD logger at the spawning grounds would also be useful, in identifying the daily salt front and corresponding spawning grounds. Vemco temperature loggers to be deployed upper and lower Stewiacke River same as previous years. Temperature of water very similar at Alton, and Stewiacke River, but

multiple loggers remain a good idea, and provide 'insurance' in case of loss of logger.  
Budget item: CTD logger, temperature logger.

**Water velocity:** April to October 2012. At Alton, drogue-buoy runs following each plankton net tow is now standard procedure to allow actual abundance data on ebb and flood tide.

New for 2012 : To assess margins as potential microhabitat for eggs and larvae use hand-held 'wand' to measure water velocity over cross-section of estuary at three locations (Alton, Stewiacke River above Hwy#2 Bridge; Shubenacadie 2km upstream of the confluence).

New for 2012: To better understand upstream transport of eggs and larvae, additional drogue-buoy deployment needed at following sites: Maitland to Alton (flood tide), Alton to CN bridge on Stewiacke River (flood and ebb tide), Alton to Shubenacadie (flood and ebb tide). Budget item: Zodiac hire 3 days.

**3. Alton Site: Main channel striped bass egg and larvae abundance**

May-July 2012: Focus on completing two 48-hour continuous sampling series, each tracking a large spawning event. Minimize short-term sampling over a single ebb tide. Extending the sampling from 36 to 48 hours will capture an additional tidal cycle and provide a better measure of balance between decrease in egg abundance on the ebb tide and upstream transport on the flood tide. Increased frequency of sampling on the flood tide compared to 2011 is essential. Seven or eight flood tide samples can be achieved by using two boats working in tandem. Water velocity estimates using drogue-buoys will be conducted following all plankton net tows during daylight. Drogue-buoys with LED beacons will be tested for night sampling.

Budget items: 500uM plankton net (need a second one). GPS device (relied on R. Schicht personal device 2010-11). Campbell Scientific sonar to measure river height (device loaned from NS Govt. needed for other work in 2012).

**4. Alton Site: Margins/still water striped bass egg and larvae abundance**

May-July 2012: New sampling regime to test hypothesis shallows close to bank are preferred microhabitat for larvae and a settling zone for eggs, using both plankton net and seine net. Also incorporates water velocity measurements. Highly relevant to proposed diversion channel. Budget item: Perhaps we need a smaller more time efficient seine net to sample shallow water efficiently.

**5. Downstream transport of eggs and larvae**

May-June 2012: Focus on downstream transport of eggs and larvae from spawning grounds on the Stewiacke River to Alton site. Plankton net sampling in both the main channel and the margins. Incorporate drogue-buoy deployment for velocity estimates. Include the use of two boats at fixed locations. No need to sample Cobequid Bay, we

know advection occurs. A measure of advection can be achieved by manual plankton net tows conducted at Black Rock.

**6. Upstream transport of eggs and larvae**

May-June 2012: Flood tide sampling to be conducted at a greater frequency than in 2011 to gain a better understanding of the dynamics of upstream transportation. Flood tide sampling was not done in 2008-10 and only on a small scale in 2011. Most of sampling to be conducted at the Alton site. On two occasions while flood tide sampling is conducted at Alton the second boat will be positioned 5km upstream of the confluence on the Shubenacadie and then the Stewiacke rivers. Some sampling from Maitland in the Zodiac.

**7. Age and growth estimate of larvae and young of the year Juveniles**

Two years work. June-September 2012. Plankton net tows for 7mm larvae followed by beach seining at Alton site for larvae and YOY. Sufficient numbers of fish to allow estimation of relative survival of cohorts based on birth-date estimations from counting daily growth rings on otoliths. In collaboration with Rod Bradford. Otoliths will be stored and processed on Buehler isomet saw after field season is complete (October). Archived DFO otoliths: processed winter 2012-13.

Field work 2013: Continue under direction of Rod Bradford. May include processing otoliths from adult fish sampled at trap net to be installed at Enfield spring 2013.

**8. Laboratory experiments NSAC**

June 2012: Collect wild eggs from Stewiacke River under licence from DFO.

1. Effect of low temperature (10 to 15 °C) on time to hatch and survival of striped bass eggs. To add to three data points taken in 2011. Work is relevant because initial spawning of striped bass often around 12 °C. Need to have good understanding of effect of temperature on hatch rate.
2. Effect of salinity on buoyancy/sinking rate of striped bass eggs and larvae. Continuation of 2011 expts. Work is relevant since low velocity zones may be areas where eggs settle.

**9. Reporting.**

1. Monthly reports to Alton Gas.
2. Jan 2013: Annual report to Alton Gas.
3. Submit one MS to journal (TAFS) by end of 2012. Timing of spawning 2008-2011 data. Temperature data. Fecundity data.
4. Begin drafting second publication. Temporal distribution of eggs and larvae. Includes downstream and upstream transportation data.

Alton Natural Gas Storage Project

**Shubenacadie River Monitoring: Report on 2011 season**

G. Stewart and J. Duston

Department of Plant and Animal Sciences,  
Nova Scotia Agricultural College (NSAC),  
Truro, B2N 5E3

Report date: Feb 17 2012

Contact Information

Tel:

## Table of Contents

Abstract.....	4
Introduction.....	5
Methods .....	6
Results and discussion.....	8
1. Striped bass pre-spawning period.....	8
2. Striped bass spawning period.....	10
3. Striped bass egg density and abundance with respect to tide.....	16
4. Striped bass larvae .....	25
5. Striped bass larvae temporal and spatial distribution .....	29
6. Striped bass growth, juveniles and otoliths.....	34
7. Striped bass recruitment.....	37
5. Mysids.....	39
Conclusions.....	41
Acknowledgements .....	41
References.....	42

## List of Figures and Tables

Fig. 1. Shubenacadie and Stewiacke River map .....	7
Fig. 2. Daily mean temperature, Alton site and Upper and Lower Stewiacke River.....	9
Fig. 3. Stewiacke River water temperature 2008-2011 .....	10
Fig. 4. Striped bass spawning activity 1992-2011 .....	11
Fig. 5. Hourly change in water temperature May 26 to May 29, 2011 .....	12
Fig. 6. Striped bass daily egg density 2008-2009 .....	13
Fig. 7. Striped bass daily egg density 2010-2011 .....	14
Fig. 8. Striped bass egg density at the Alton site May 25, 2010.....	17
Fig. 9. Ebb tide water velocity on the Stewiacke River, May 26.....	17
Fig. 10. Striped bass egg density and salinity over 36 hours May 23 to 24, 2011.....	18
Fig. 11. Striped bass egg time to hatch vs. temperature.....	19
Fig. 12. Striped bass egg density and abundance over 36 hours May 23 to 24, 2011 ...	19
Fig. 13. Ebb tide water velocity on the Shubenacadie River, June 16.....	20
Fig. 14. Ebb tide water velocity at Alton, May 18 vs May 23.....	21
Fig. 15. Cobequid Bay map, showing the narrow channels at low tide .....	22
Fig. 16. Striped bass egg density and abundance over 36 hours May 29 to 30, 2011 ...	24
Fig. 17. Striped bass daily larvae density 2010-2011 .....	27
Fig. 18. Striped bass daily larvae density 2008-2009 .....	28
Fig. 19. Striped bass larvae density and abundance June 6 and 11, 2011 .....	31
Fig. 20. Striped bass mean body length 2008, 2010 and 2011 .....	35
Fig. 21. Total monthly precipitation April-September 1999 and 2008-2011 .....	38
Fig. 22. Mean monthly air temperature April-September 1999 and 2008-2011 .....	38
Fig. 23. Mysid daily density 2010-2011 .....	40
Table 1. Timing of striped bass spawning at the Alton site .....	11
Table 2. Striped bass body length comparison, plankton vs. seine netting .....	29
Table 3. Upriver spatial striped bass egg and larvae density June 3, 2011 .....	32

Table 4. Upriver spatial striped bass egg and larvae density June 10, 2011.....	33
Table 5. Total monthly rainfall 2008-2011.....	36
Table 6. Number of striped bass caught per seine net at Alton .....	36
Table 7. Estimated hatch date as judged by otoliths .....	36

## Abstract

The tidal portion of the Shubenacadie and Stewiacke Rivers are a nursery habitat for striped bass (*Morone saxatilis*) early life stages: eggs, larvae and young of the year (YOY). In 2011 spawning commenced on par with both 2008 and 2009, all later than 2010. At the diversion channel site eggs were first detected May 18, 2011 with the first major spawning event May 22. Similar to the past three years four major spawning events occurred when daily mean egg density  $\sim 1000$  eggs/m<sup>3</sup> (May 22, 29, June 2, 10). The second spawning in 2011 peaked at 3500 eggs/m<sup>3</sup> on May 29, the highest recorded in the past four years. Total egg production for the season was around 22 billion based solely on eggs in the main channel (which represents approximately 30% of the total cross-section of the channel). This estimate represents eggs from about 24,000 spawning females. Eggs were distributed as far as 10 km upstream of the Alton site and 18 km out into Cobequid Bay. At the Alton site, specific cohorts of eggs drifted past the planned Alton channel at least three times on the ebb and a further three times on the flood tide. The density of larvae was 10 to 100-fold lower than eggs, similar to past years. However, daily mean density of larvae in 2011 was the highest recorded in the past four years, exceeding 800 larvae/m<sup>3</sup> on two days in early June. Heavy rain and high tides around June 15 greatly reduced the salinity and abundance of larvae for several days. Sampling on the flood tide was conducted routinely in 2011 and revealed high numbers of eggs and larvae being swept upstream. Larvae and juvenile growth rate of during July and August 2011 was considerably lower than both 2010 and 2008 due to relatively low water temperatures. We estimate recruitment in 2011 will be lower than 2010 and similar to 2008, based on relative abundance of juveniles in late summer and their body size



## Introduction

Four years of plankton net sampling has yielded a large quantity of data on the relative high abundance of striped bass (*Morone saxatilis*) eggs and larvae and the mysid shrimp (*Neomysis americana*) in the Shubenacadie estuary. By comparison, beach-seining netted relatively few young of the year juveniles, providing an indicator of the high natural mortality typical of early life stages of marine pelagic fish such as striped bass. Reported here are the main findings from 2011 set into perspective against the 2008-10 data and a new DFO paper on the Bay of Fundy striped bass (Bradford and LeBlanc 2012). In 2011 the biggest advance in quantifying temporal changes in striped bass egg and larvae abundance at the Alton site came from integrating the tidal changes of water velocity and river cross-sectional area. Acoustic doppler data collected in Fall 2006 of water velocity across the cross-section over the tidal cycle enabled estimates of density (units: number of organisms/m<sup>3</sup> of water) to be converted into abundance per unit time, a more biologically meaningful measure. Sampling during the flood tide was included on a regular basis in 2011 and helped improved our understanding of the estuarine transport dynamics of eggs and larvae.

Spatial distribution of striped bass early life stages was mapped in more detail in 2011 than previous years. Addition of a second flat-bottomed boat allowed simultaneous monitoring of both the Stewiacke and Shubenacadie Rivers up to 10km upstream of their confluence. In addition, hiring the Zodiac boat based at Maitland, rather than Urbania (2010), allowed more efficient monitoring of the lower estuary and Cobequid Bay.

Dr. R. Bradford (DFO) introduced us to the value of collecting the otoliths (ear bones) from young-of-the year (YOY) striped bass juveniles (Jones and Brothers 1987). Comparing the relative abundance of YOY to their age by counting the otolith daily growth rings can be matched with the environmental conditions during the critical egg and early larval stages when mortality is highest. Otolith analysis is a time-consuming but valuable tool to identify factors, both natural and anthropogenic, affecting survival of YOY fish and could be an important addition to the ongoing monitoring program.

## Methods

Most of the methods are described in Stewart and Duston (2011 a,b). Sagittal otoliths were mounted in araldite and viewed under a microscope. The method for aging wild fish was validated by counting the rings of cultured larvae of known age. Processing of otoliths to improve visualization of the rings was not possible, so rings could only be read on the translucent otoliths from fish less than 20 mm total length. To estimate egg production per female, in April 2011 sixteen large pre-spawning females were obtained from drift-net fishers. Fecundity was estimated by counting the number of oocytes in each of three pre-weighed samples (each about 1 gm) from one ovary, and then compared with the entire ovary weight. Total egg production estimates were achieved by factoring in the change in water velocity and estuary cross-sectional area throughout the tidal cycle. An Acoustic Doppler Current Profiler (ADCP) was used on October 16-17 and November 6, 2006 to measure the vertical profile of the water velocity across the full width of the estuary at the Alton site. The instrument was towed back and forth behind a Zodiac boat until 3 or more successive crossings yielded a less than 5% deviation from one another. Approximately two good sets (minimum three transects) were taken every hour over the full tidal cycle. We used the ADCP dataset to determine the cross-sectional area of the main channel, which was taken as 30% of the total cross-section. Since all plankton net tows were taken in the main channel, estimates of abundance of ichthyoplankton were restricted to this portion of the estuary, and hence are a conservative underestimate of total abundance. Water velocity data on the ebb tide in the main channel during our sampling was determined using a drogue-buoy pair (see Stewart and Duston 2011 a,b). However, for the flood tide water velocity estimates, we relied solely on the ADCP dataset because our own drogue-buoy data were too few and variable.

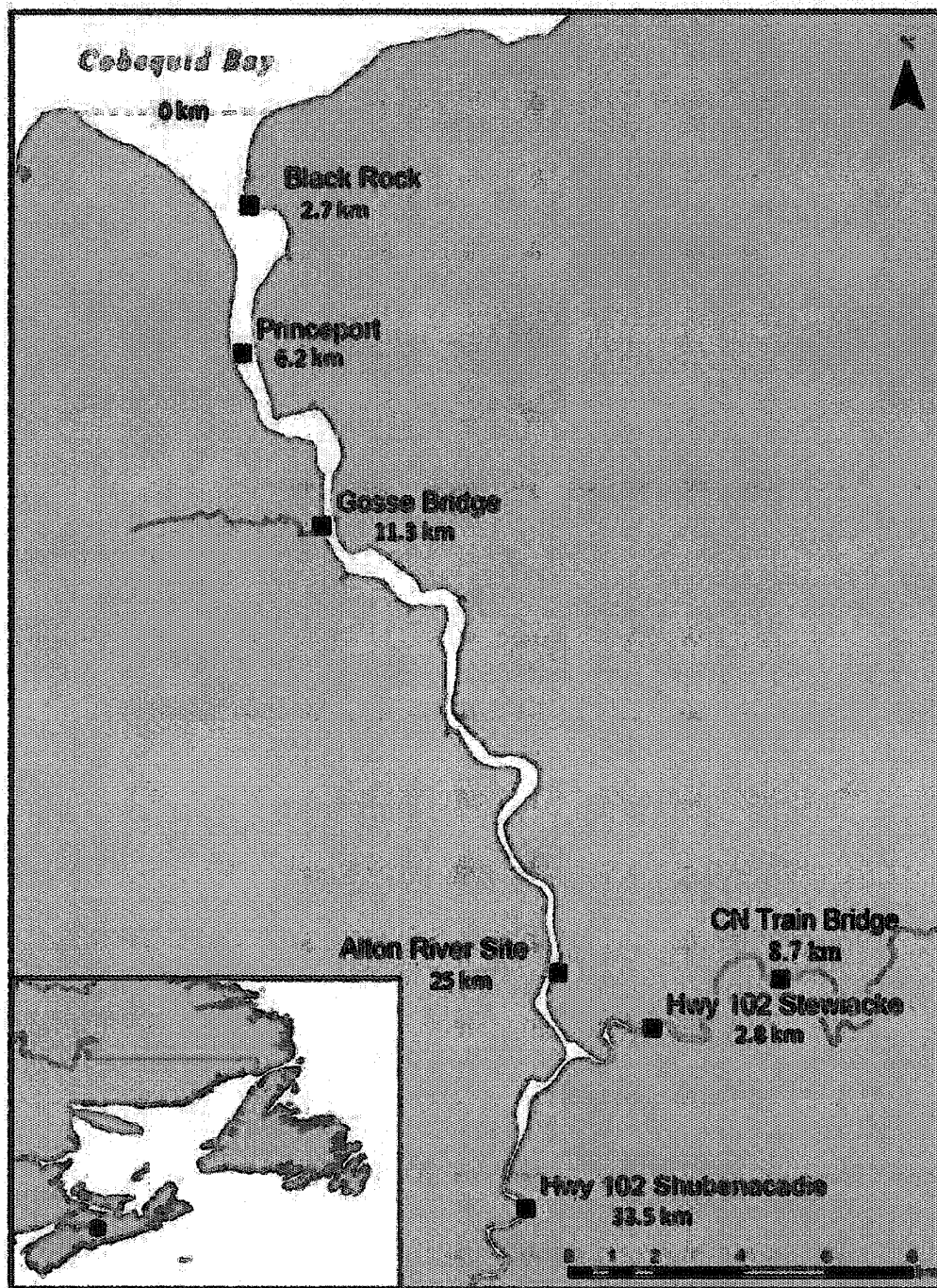


Fig. 1 Shubenacadie and Stewiacke Rivers showing the distance of the sampling sites from the mouth of each river.

## Results and Discussion

### 1. *Striped bass Pre-spawning Period*

Day length and temperature are the principal environmental factors controlling the cycle of gonadal maturation and spawning. Gonadal maturation commences in the fall when females begin incorporating yolk into the developing eggs. The process continues through winter despite the low temperature. Adults are known to over-winter in Grand Lake beneath the ice. In addition, a proportion of adults overwinter in seawater (Bradford and LeBlanc 2012). The increasing day length and increase in temperature in early spring stimulates migration out of Grand Lake (Douglas et al. 2003). In April adults are present in the Shubenacadie estuary. The current large number of adults is due to high recruitment of the 1999 year-class (Bradford and LeBlanc 2012). In 1999, a warm dry spring and warm September are likely the main factors responsible for the large year class. To estimate numbers of spawning females from egg abundance data, sixteen large 'keeper' females (>68cm TL; 5.72 to 8.23kg) close to spawning were obtained from drift-net fishers. Their mean weight was 6.68 kg ( $\pm 0.198$  SE) and mean fecundity  $9.0 \times 10^5$  eggs ( $\pm 76354$  SE). This estimate is likely greater than the true average since the fish sampled were relatively large.

During the pre-spawning period the adults move up and down the estuary. Throughout May and June, pre-spawned fish are caught in both gill-nets and by rod and line over a wide range in the Shubenacadie estuary to above the head-of-the-tide on the Stewiacke River. Closer to spawning, adults congregate in the Stewiacke River, the principal spawning site. Water temperature during May and June of the Stewiacke River, both above and below the head-of-the tide, and the Shubenacadie estuary at the Alton site are very similar, as illustrated in the temperature profiles for 2008-2010 (Fig. 2). The 2011 monitoring confirmed the temperatures from the Alton site up to Forest Glen are with a degree of each other (data not shown). There is no evidence the spawning grounds have a unique thermal profile.

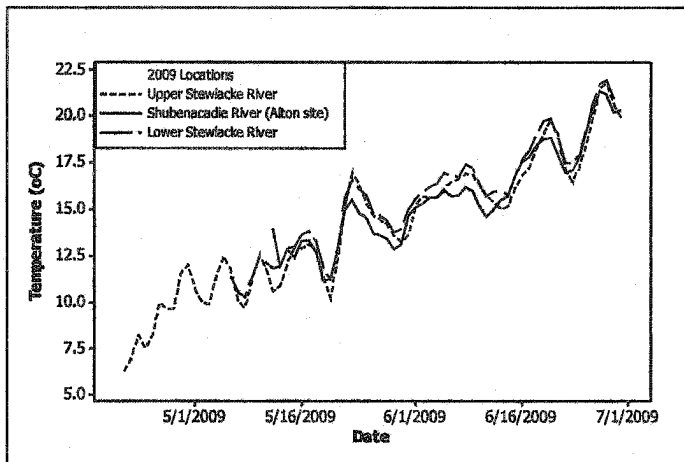
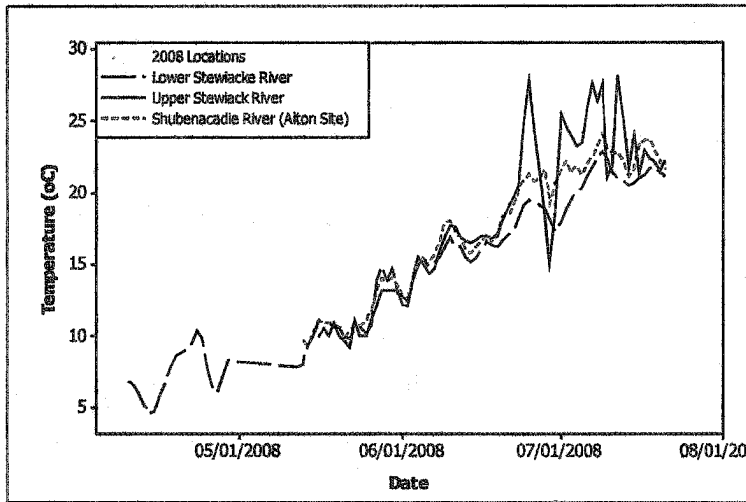
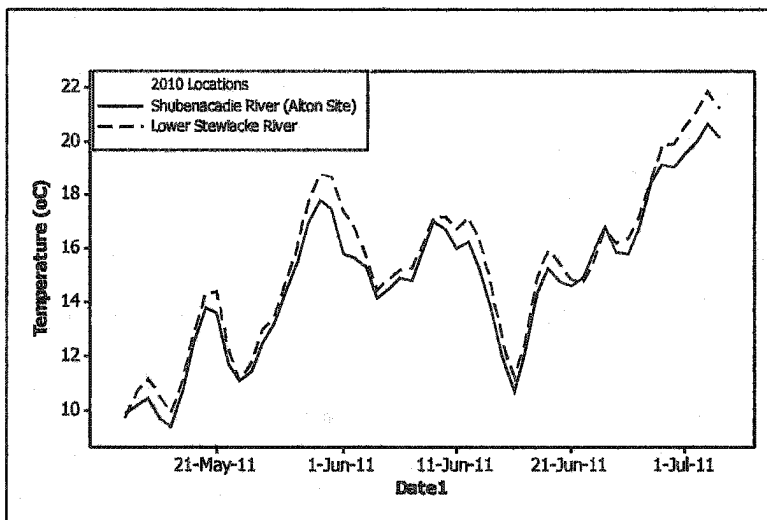


Fig. 2. Mean daily water temperature 2008-2010 of the Upper Stewiacke River (Forest Glen), Lower Stewiacke River (1 km upstream of confluence), and Shubenacadie River at the Alton Gas site.



Spawning does not occur in April, although the oocytes appear to have completed yolk incorporation by this time. The first week of May also seems too early for spawning; even in 2010 when 15 °C was reached on May 7 only 3 eggs were detected. By comparison, the males are functionally mature at this time, releasing milt when hand pressure is applied to their abdomen.

## 2. *Striped bass spawning period*

Small numbers of eggs are typically detected a few days before the first major spawning event. Over the past four years, the earliest eggs were detected was May 7, 2010 (Table 1). This was associated with the Stewiacke River reaching 15 °C, >5 °C warmer than average (Fig. 3).

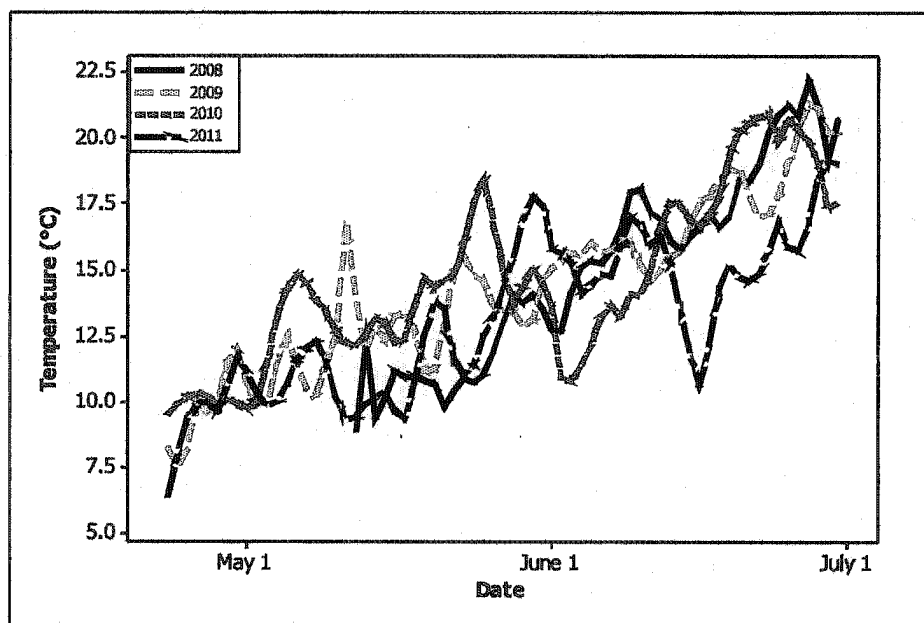


Fig. 3. Stewiacke River water temperature 2008-2011.

The first major spawning event in 2011 was on May 22, compared to May 17-30 in previous years (Table 1). In 2008, the late spawning was associated with relatively low temperatures in May. The end of spawning season is around late-June or early-July (Table 1). In 2011 the presence of eggs on July 6 was the latest date on record (Fig. 4).

Table 1. Timing of striped bass eggs at Alton site 2008-2011.

	2008	2009	2010	2011
Eggs first detected	May 25	May 18	May 7	May 18
First big spawn	May 30	May 24	May 17	May 22
Final date eggs detected	June 24	June 26	July 2	July 6

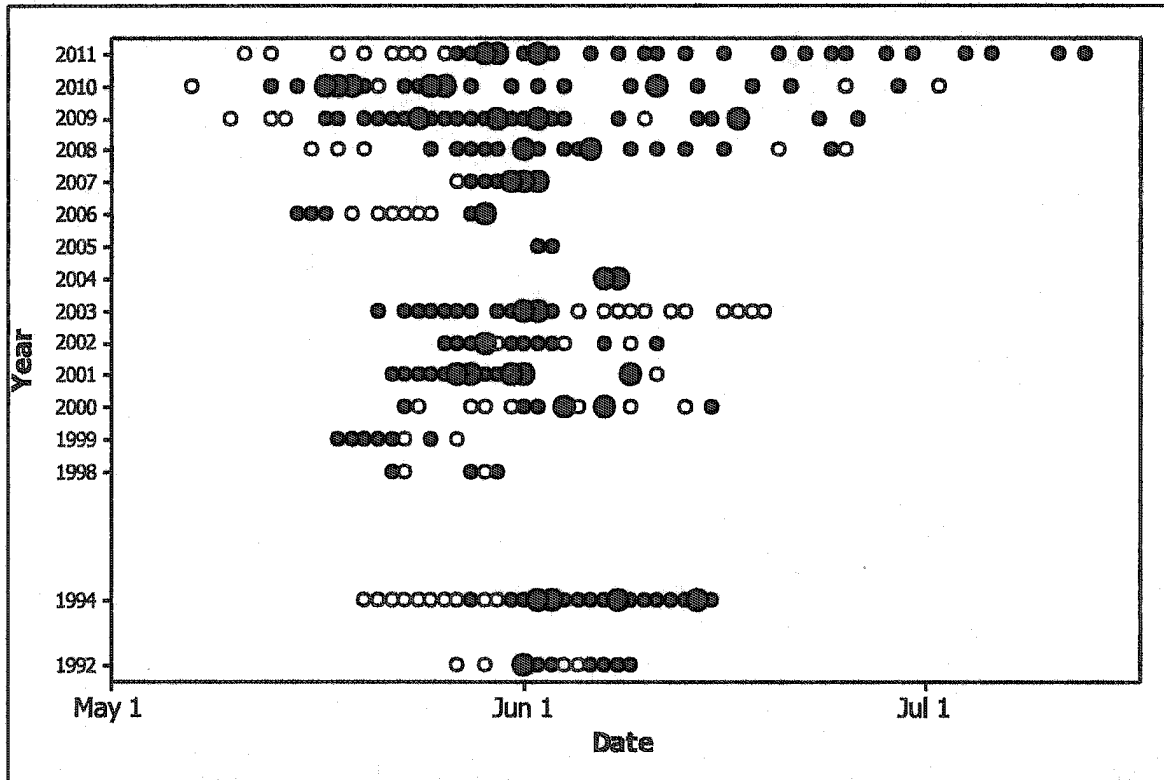


Fig. 4. Striped bass spawning activity (solid circles) in the Stewiacke River (1992, 1994, 1998-2009) and Shubenacadie River (2008-2011) as judged by either visual observation of adults rolling at the surface or presence of eggs collected in a plankton net. Open circles indicate when no eggs were detected in plankton net tows. Within each year, the larger solid circles indicate a relatively large spawning event based on a subjective estimate of egg abundance. Comparisons between years of the magnitude of spawning events are not valid. Source of data: 2008-11 this study; 1998-2007: J. Duston and B. Stone unpubl. observations; 1994: Rulifson and Tull 1999; 1992: Rulifson and Wood unpubl., cited by Rulifson and Dadswell 1995.

Predicting the timing of the first big spawn is difficult. A warming trend increases the chances of spawning, but the first spawn can occur when temperature is declining from a peak, as occurred in both 2010 and 2011. This lag in response is likely due to the time needed for the eggs to complete final maturation following the warm temperature stimulus. Accordingly, the first significant spawning event in 2011 ( $>100$  eggs/m<sup>3</sup>) was on May 22 following a warming from 10 to 14 °C, but occurred when temperature was  $<12$  °C. The second spawning in 2011 followed a rapid warming trend from 13 to 18 °C between May 26 and May 29 (Fig. 5). Over a tidal cycle, temperature typically changes between 1 to 3 °C (Fig. 5; Rulifson and Tull 1999). The incoming tide can either be warmed or chilled as it passes over the mud flats depending on time of day and amount of solar radiation. In 2001, Bradford and LeBlanc (2012) reported unusually large fluctuations in water temperature from  $<15$  °C to  $>25$  °C over a tidal cycle. These large swings in temperature may have been due to the logger being exposed to air.

Associated with the warming trend, daily mean egg density at Alton site increased from zero on May 26, 10 eggs/m<sup>3</sup> May 27, 100 eggs/m<sup>3</sup> May 28, to a peak of 3500 eggs/m<sup>3</sup> on May 29, the highest recorded in the past four years (compare Figs. 6 and 7).

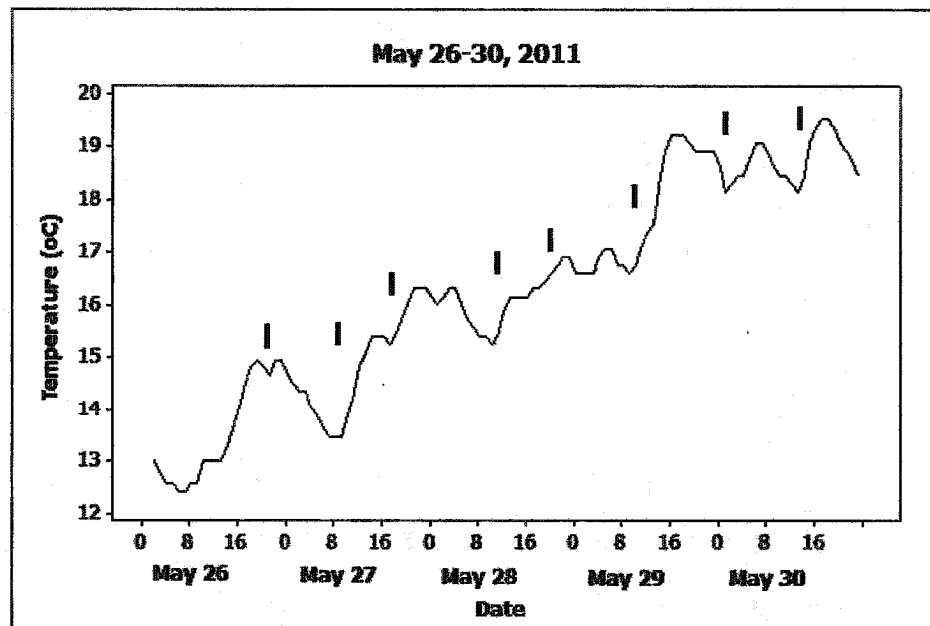


Fig. 5. Lower Stewiacke River temperature at hourly intervals leading up to a large spawning event May 29. The short vertical bars indicate the timing of the tidal bore.



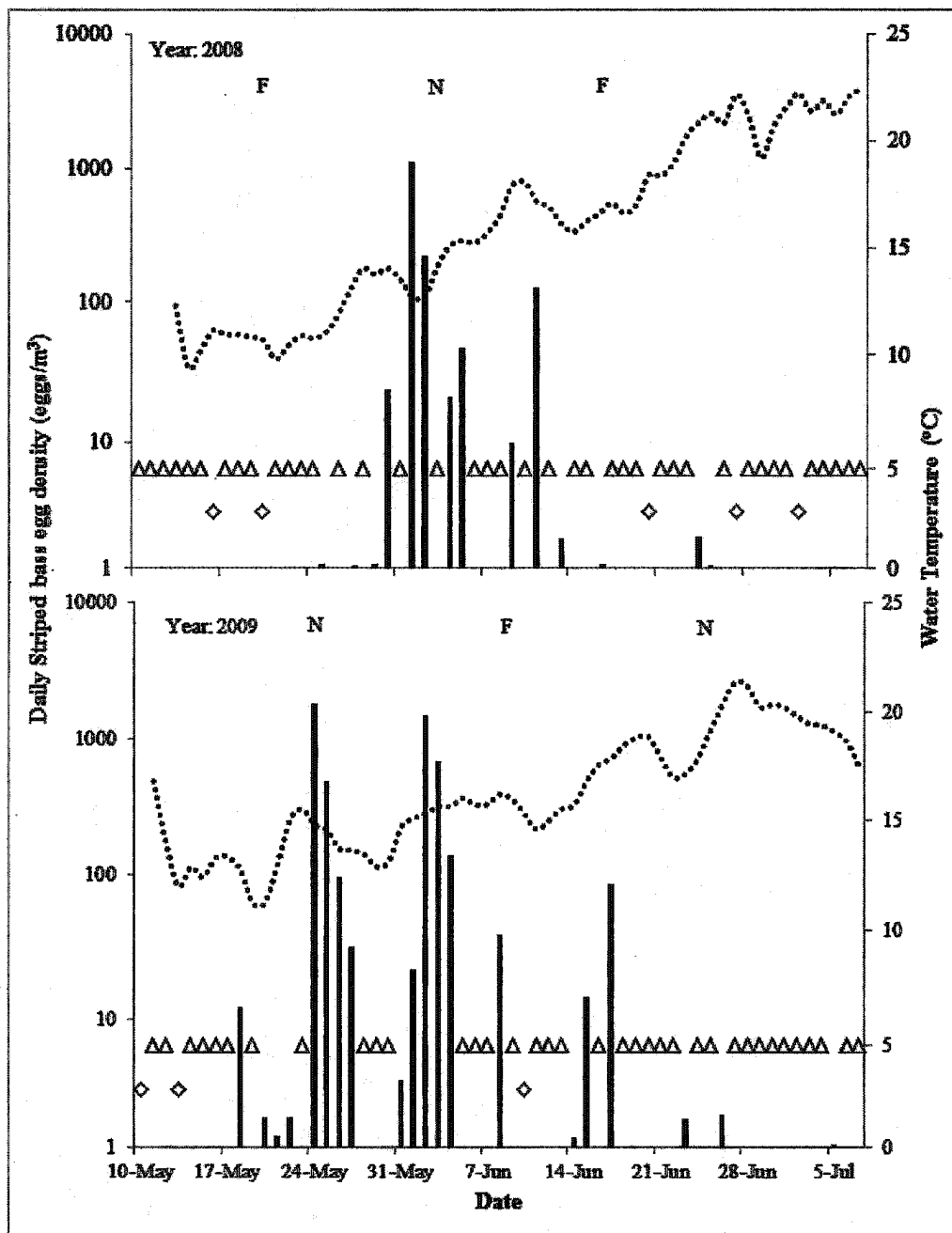


Fig. 6. Striped bass egg density in 2008 and 2009 (daily mean eggs per m<sup>3</sup>) at the Alton sampling site on the Shubenacadie River and temperature (dotted line). Open diamonds indicate days when sampling was conducted but no eggs were detected, open triangles indicate days when no sampling occurred. F=full moon, N=new moon.

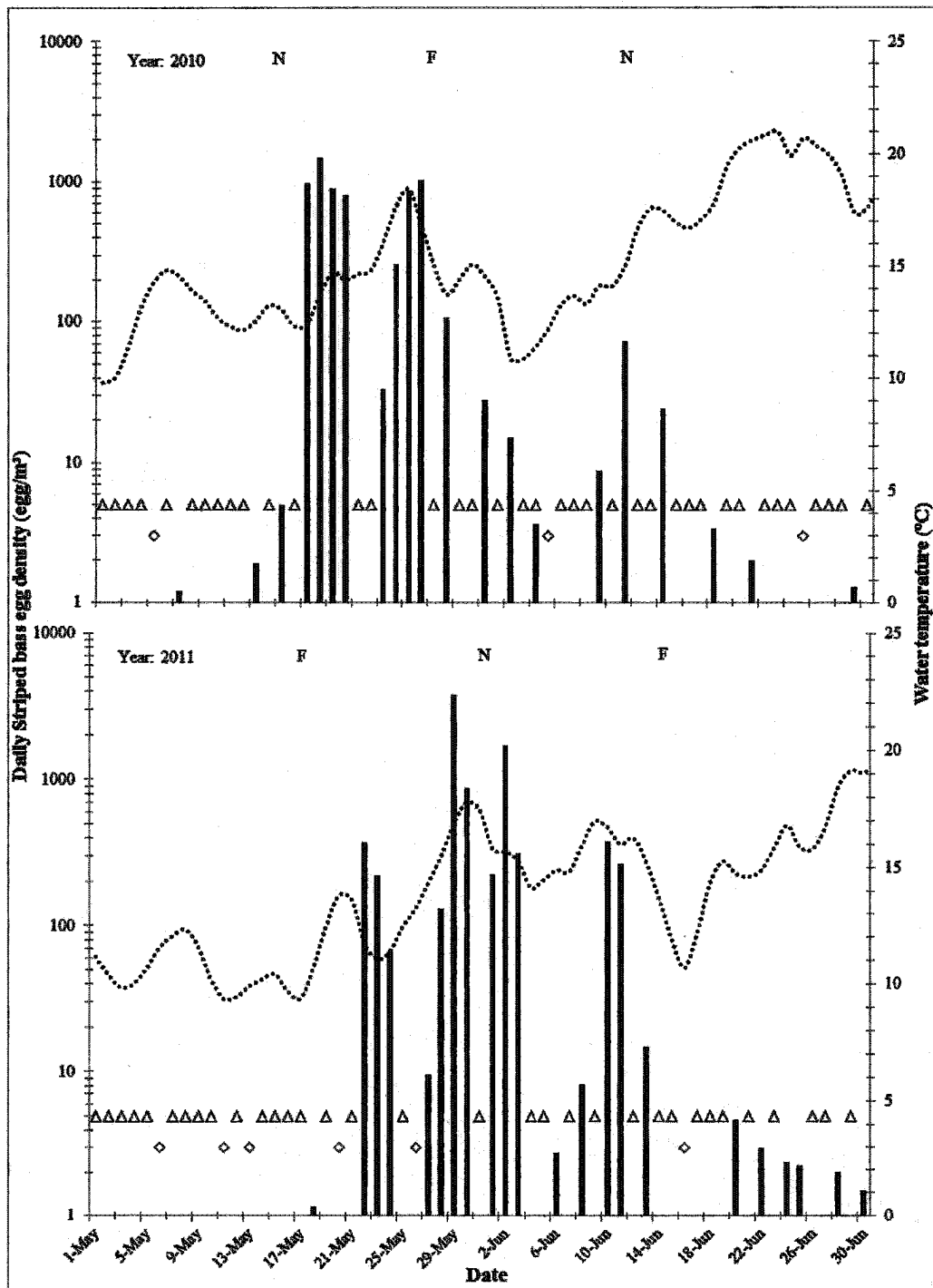


Fig. 7. Striped bass egg density 2010 and 2011 (daily mean eggs per m<sup>3</sup>) at the Alton sampling site on the Shubenacadie River and temperature (dotted line). Open diamonds indicate days when sampling was conducted but no eggs were detected, open triangles indicate days when no sampling occurred. F=full moon, N=new moon.

On May 29, 2011, the total number of eggs in the main channel drifting past the Alton site was about 9.3 billion, equivalent to eggs from about 10,500 females. Over the following two weeks additional relatively large spawning events were on June 2 and June 10 (Fig. 7 lower panel). In mid-June, cold weather and rain resulted in a drop in water temperature and a cessation of spawning. Small spawning events resumed in late June, with eggs detected through to July 6, the latest date in the past four years. For the entire 2011 season, accounting for eggs returning on successive tides, the total number of eggs spawned was estimated at 22 billion, from about 24,000 females. This number is lower than that reported in Stewart and Duston (2011b) because of re-calculation of estuary cross-sectional area due to a mal-function of the sonar measuring water height. Our estimate of egg production is over 500-fold higher than in 1994 (Rulifson and Tull, 1999) and the estimate of the striped bass spawning population is 2-fold higher than in 2002 (Douglas et al., 2003).

The daily mean egg density graphs provide a useful summary of spawning activity in each of the past four years (Figs. 6 and 7). Following the start of spawning, the general pattern of egg production has followed a similar pattern over the past four years, with about four major spawning events each separated by about 5 to 7 days, each resulting in daily mean egg density exceeding 100 eggs/m<sup>3</sup>. Each daily mean is derived from six to ten tows over several hours, usually over one ebb tide. Four years sampling established a valuable baseline showing the inter-annual differences in spawning activity. The rationale for continuing this sampling regime in future is as follows:

1. Allows comparison of the relative density of ichthyoplankton in the Shubenacadie main channel with the diversion channel, following its construction.
2. Provides a measure of the relative health and magnitude of the adult spawning population. Contrary to the suggestion the life span is >25 years (Douglas et al. 2003), we speculate it may be <15 years, resulting in a decline in egg production over the next five years due to the demise of the large 1999 year-class. Evidence: in 1994, 80% of striped bass netted from the Stewiacke River were either 4 or 5 year old (44 and 52cm fork length FL; Paramore 1998). By 1999, these fish would have been 9-10 yr old (78 to 83 cm FL), yet these age classes made up <1% of fish trapped on the Shubenacadie River at Enfield in 1999-2002 (Fig. 16 in Douglas et

al. 2003). Similarly, in spring 2002, about 50% of bass caught at the Enfield trap were 3+ year-old, but in spring 2009 very few of this year-class were caught in an angler survey judging from annual growth rings on the scales (Duston 2010). Confounding factors/unknowns: a) the proportion of adults that overwinter at sea; b) differences in gear to catch adults: trap-net vs. gill net vs. rod and line; c) the accuracy of ageing striped bass by scale readings. Among Chesapeake Bay striped bass, scale reading was accurate  $\pm 2$  years for fish up to 11 years old, but was highly inaccurate for fish over 20 years old. By comparison, otolith annual growth ring counts were 100% accurate (Secor et al. 1995).

3. Allows determination of which cohorts of eggs survive to become YOY juveniles. Knowing the timing of production of the main cohorts of eggs is valuable if the program includes age determination of YOY striped bass juveniles by otolith analysis. Determining the relative abundance of specific cohorts of YOY striped to the magnitude of egg production for that cohort can identify causes of mortality of the delicate early life stages (Martino and Houde 2010). This is directly relevant to the ongoing monitoring program which aims to assess the risk of the planned brining operation on the Shubenacadie ecosystem.

### *3. Striped bass egg density and abundance with respect to tide*

Quantifying egg density per cubic meter of water filtered over the course of the ebb tide has been standard practice since monitoring started in May 2008. A recurring pattern following a spawning event upstream was for egg density to increase progressively through the ebb tide. In 2010, by determining the cross sectional area of the estuary we established this increase in egg density was due to increased abundance of eggs and not simply due to narrowing of the estuary channel (Fig. 8).

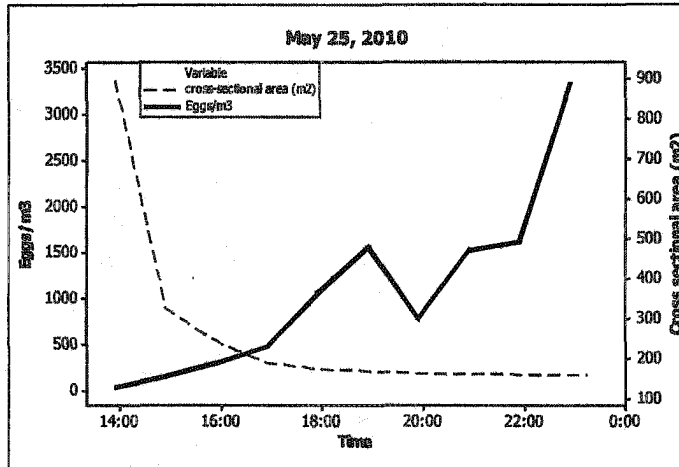


Fig. 8. Striped bass egg density (eggs/m<sup>3</sup>) and estuary cross-sectional area at the Alton diversion channel site May 25, 2010.

This 'positioning' of the eggs late in the ebb tide is dictated by the timing and location of the release of eggs by the female broodstock, and water velocity. We hypothesized this was a spawning tactic to increase retention of eggs in the estuary (Stewart and Duston 2011a). In spring 2011, drogue-buoy tracking from the spawning grounds supported this hypothesis by showing eggs released by females at the beginning of the ebb tide can take up to seven hours to reach the Alton site due to the low water velocity in the upper estuary (Fig. 9).

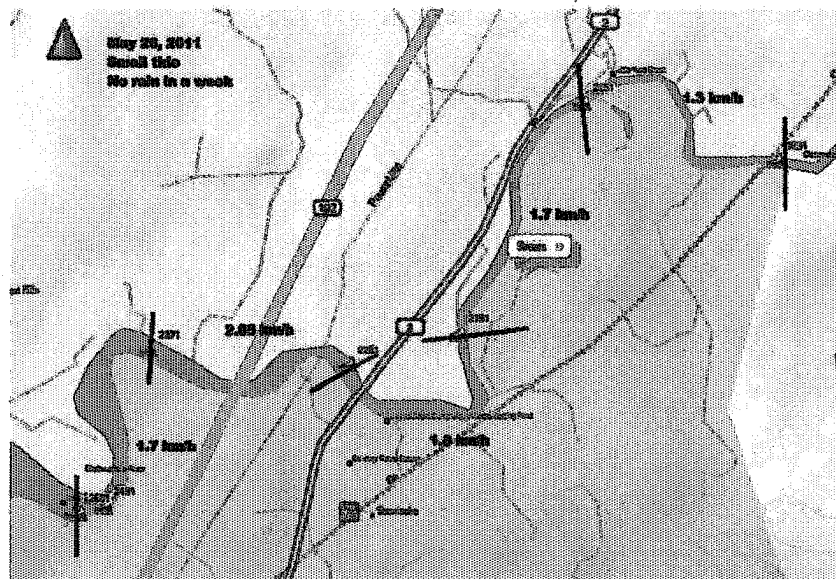


Fig. 9. Water velocity (km/h) of a drogue-buoy pair deployed at the turn-of-the-tide at the CN rail bridge over five sections of the Stewiacke River estuary (indicated by the black lines), ending about 1km from the confluence with the Shubenacadie River.

To our surprise, the temporal distribution of eggs from the first spawning event in 2011 (May 23) did not follow the usual trend. Instead, egg density peaked early in the ebb tide (Fig. 10). A possible explanation is the freshwater run-off was relatively high at this time, as indicated by relatively low salinity at Alton of 8 ppt at high tide. The high freshet would suppress the upstream limit of the brackish water, likely causing spawning to occur further downstream than normal. This coupled with higher water velocity on the ebb tide would cause eggs to reach Alton earlier in the ebb tide. However, this explanation does not always apply since in 2008 salinity/run-off conditions were similar to 2011, yet egg density was highest at the end of the ebb.

Over the next 36 hours the May 23 cohort of eggs drifted back and forth past the Alton site confirming the 2010 finding that eggs can drift past the Alton site at least three times on the ebb and a further three times on the flood tide. We are confident this was a single cohort of eggs because the low water temperature, ca. 12 °C, caused spawning to stop, and slowed the time to hatch to about 5 days (Fig. 11).

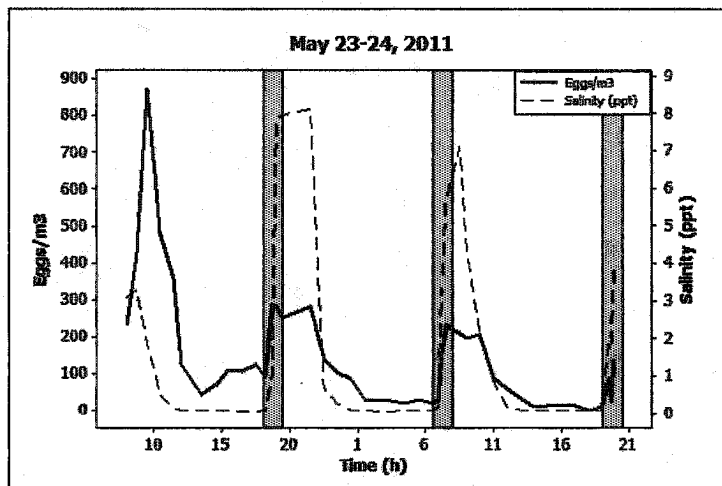


Fig. 10. Striped bass egg density (eggs/m<sup>3</sup>) and salinity (ppt) over 36 hours May 23 to 24, 2011 at the Alton site. Vertical lines and shading indicate the timing of the flood tide (May 23: 18:10h to 19:45h, May 24: 06:35h to 08:00h and 19:10h to 20:30h).

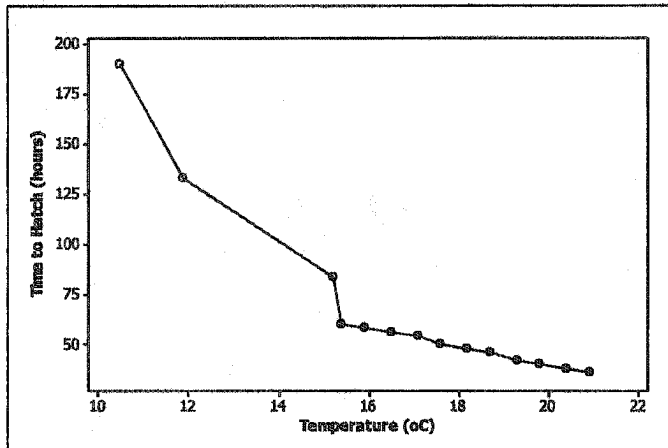


Fig. 11. Time to hatch of striped bass eggs vs. temperature. Solid circles: From Harrell et al. 1990. Open circles: NSAC data from eggs collected from the Stewiacke River May 28, 2011. They were 'new' eggs but time of fertilization is unknown.

The enormity of egg production was revealed for the first time in 2011 by converting eggs per cubic meter to actual abundance by factoring in the cross-sectional area of the water column and water velocity. Early in the ebb tide on May 23 the peak of 800 eggs/m<sup>3</sup> equated to close to 187,000 eggs per second in the Shubenacadie main channel drifting past the Alton site (Fig. 12). On subsequent tides the second and third peaks were between 70 to 80,000 eggs per second, decreasing to <800 eggs/sec late in the ebb tide. Total egg production from the May 22 spawning was about 1.6 billion.

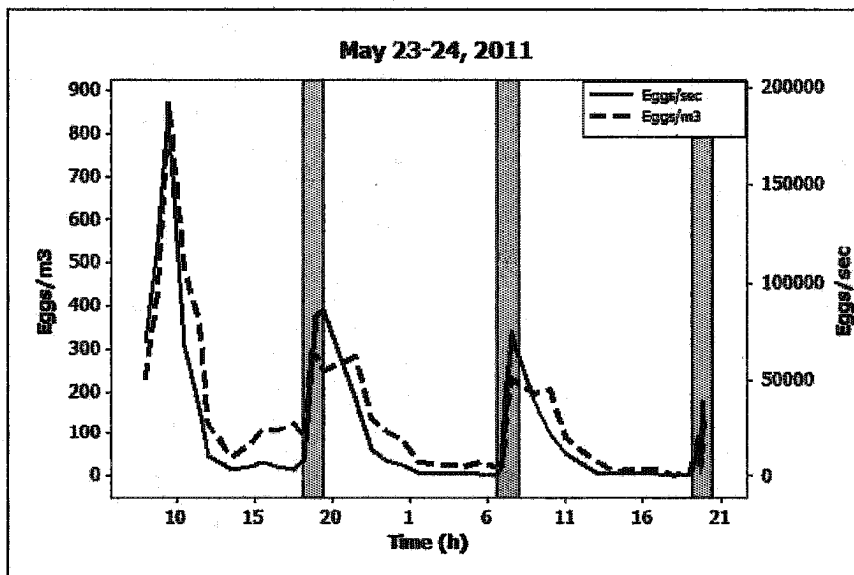


Fig. 12. Striped bass egg density (egg/m<sup>3</sup>) and abundance (eggs/sec) over 36 hours May 23 to 24, 2011 at the Alton site. Vertical lines and shading indicate the flood tide (May 23: 18:10h to 19:45h, May 24: 06:35h to 08:00h and 19:10h to 20:30h). 95% of eggs remained at the blastula stage though the 36 h sampling due to the low water temperature (11-12 °C).

Both egg density and abundance May 23-24 decreased each tidal cycle (Fig. 12), a pattern we have seen repeatedly over the past four years. The decrease is due to a combination of mortality and dispersion. In 2011 we confirmed advection into Cobequid Bay. Eggs were caught in the plankton net in the top 0.5m of the water column up to 18 km from the estuary mouth in 20ppt salinity at a density of around 22 eggs/m<sup>3</sup>. Eggs present at Alton at the start of the ebb tide that remain in the main channel during their 25km passage downstream are all flushed into Cobequid Bay in a single ebb tide since the drogue-buoys velocity is between 4.5 and >10 km/h (Fig. 13). Since the time interval between the start of the ebb tide at Alton and the arrival of the next bore at the estuary mouth is around 8 hours and 25 minutes, eggs only have to travel at 2.9km/h to reach Cobequid Bay.

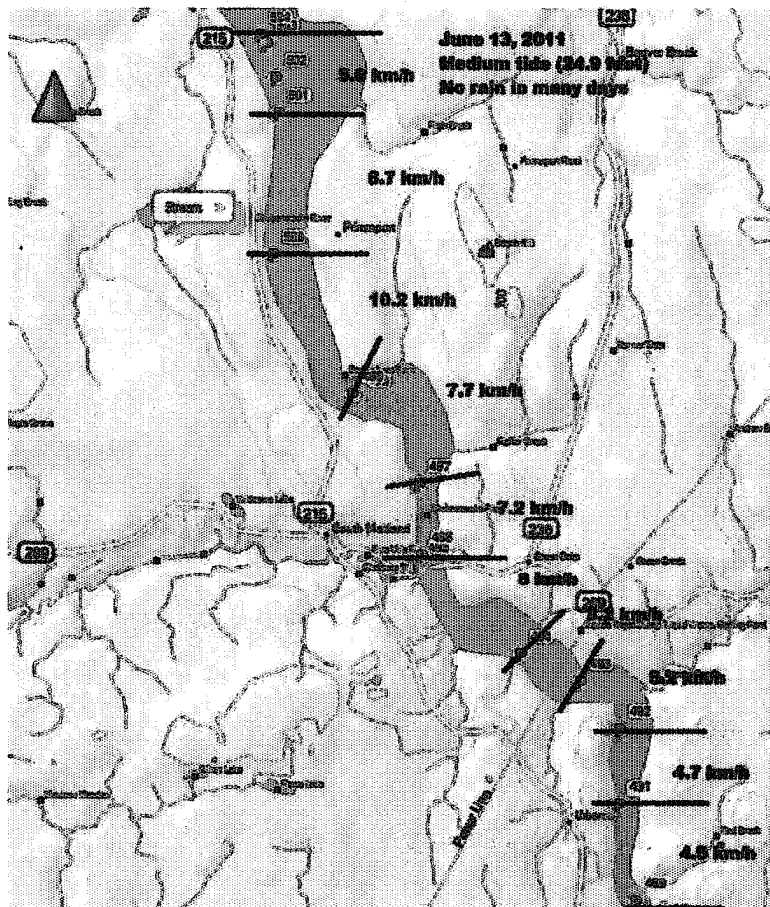


Fig. 13. Ebb tide water velocity of a drogue-buoy pair at 10 sections of the Shubenacadie estuary after being deployed at the Alton site at the turn-of-the-tide on June 13, 2011 and followed downstream in a Zodiac boat.



The temporal position of the peak egg density May 23-24 (2011) was stable for three tides, being highest early in the ebb tide. We reported a similar stability May 17-18, 2010, except peak egg density occurred late in the ebb tide for three consecutive tides (see Fig. 7 in Stewart and Duston 2011a). This stability of the temporal position of peak egg density was independent of freshwater run-off since run-off was very low in May 17-18 of 2010 yet relatively high May 23-24 of 2011 (Fig. 14). During May 23-24, 2011, the consequence of peak egg abundance at Alton early in the ebb tide was that eggs remaining in the main channel during their passage downstream would be flushed out into Cobequid Bay. Despite this advection, a proportion of the eggs made it back up to the Alton site on the next flood tide and again peaked early in the ebb tide. How this is achieved is puzzling to us. A proportion of eggs will be retained in the estuary because they drift out of the main channel into slow moving water or back eddies. Eggs carried beyond Maitland late in ebb tide are retained in estuarine water in a narrow channel bounded by large sand-banks (Fig. 15). A proportion of these eggs will be funneled back into the Shubenacadie estuary on the next flood tide. But how the eggs get concentrated into a high density by the time they pass Alton site is unclear to us. To improve understanding of the upstream transportation it would be useful to conduct more comprehensive flood tide sampling.

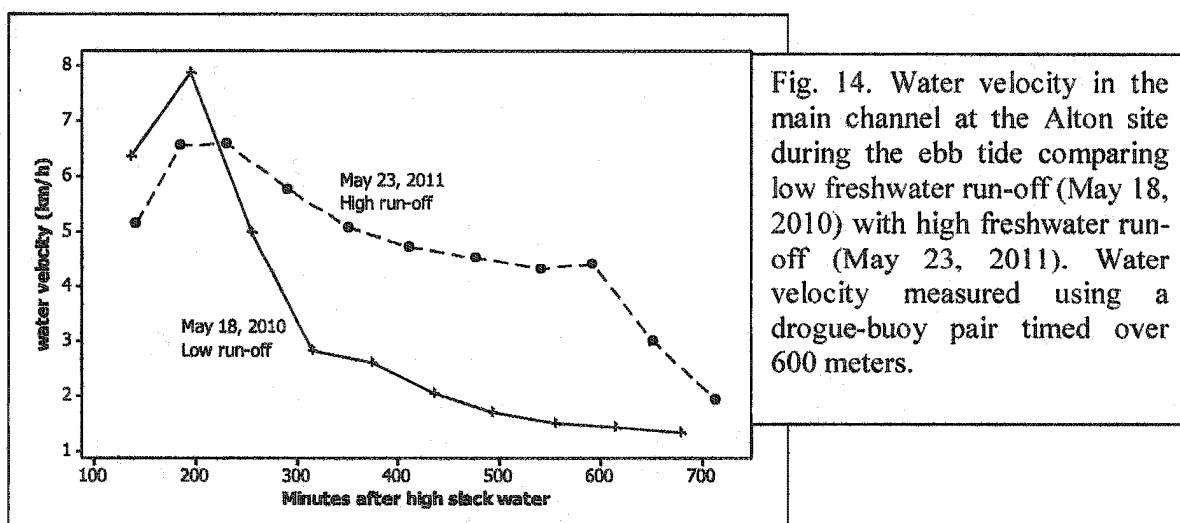


Fig. 14. Water velocity in the main channel at the Alton site during the ebb tide comparing low freshwater run-off (May 18, 2010) with high freshwater run-off (May 23, 2011). Water velocity measured using a drogue-buoy pair timed over 600 meters.

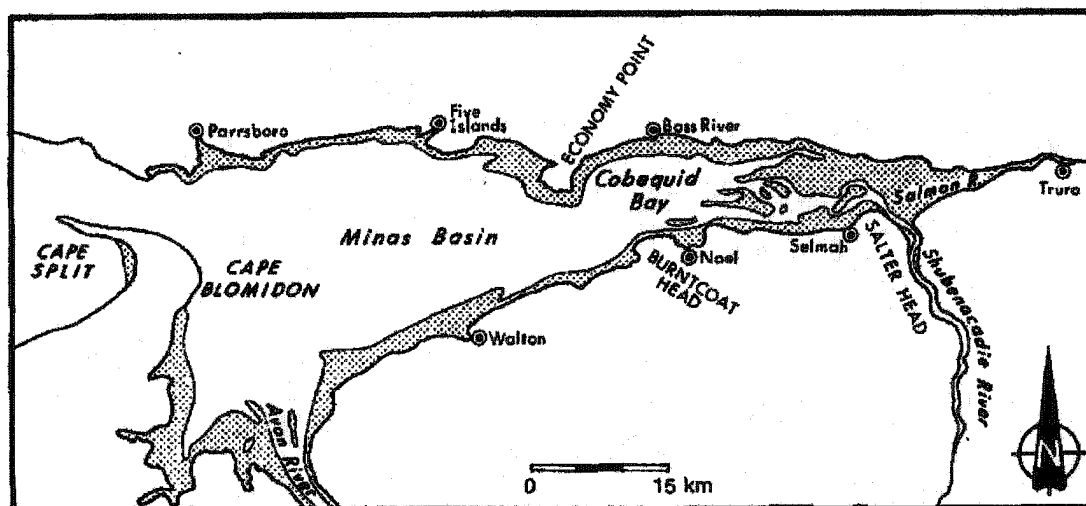


Fig. 15. Cobequid Bay, showing the narrow channels at low tide (from Dalrymple et al. 1990)

If retention of eggs is dependent on their drift into slower moving water, then egg specific gravity becomes important. Striped bass eggs are usually slightly negatively buoyant, but are maintained in suspension by the high turbulence and travel at between 80 and 100% of water velocity (Davin et al. 1999). By contrast, in static or low velocity water the eggs sink. At the Alton site on the ebb tide we have observed eggs settle in the static water close to the sand bar on the west bank. However, they are soon 'beached' as the tide recedes, and we believe will die quickly, especially if the sun is shining. In glass columns (1.2m x 5cm) filled with static water <2ppt salinity, eggs sink at around 10 to 15cm/min. (Duston unpubl. data). Downstream of Alton the salinity increases progressively, this would help keep the eggs in suspension in slow moving or static water. Eggs transferred from <1ppt salinity to 10ppt floated at the surface of a water column for at least one hour, then some started to sink, indicating their specific gravity can change (Duston unpubl.data). This finding goes against the general view that the specific gravity of fish eggs is constant. However, Cowley et al. (2009) reported the eggs of a minnow (*Hybognathus amarus*) changed their relative buoyancy. Striped bass eggs settling to the bottom of a culture tank and piling on top of each other results in high mortality. However, there's some evidence that settled striped bass eggs can hatch provided they are not buried in mud (Bayless 1968). The Shubenacadie estuary has plenty

of mud, but also firm sandy sections that may be safe havens for settled eggs. Future monitoring at the Alton site will include sampling the margins. For 2012 this sampling of quiet water may be extended upstream of the Alton site. Sampling downstream may be impractical.

The suggestion by B. Rutherford (pers. comm. Jan 28/2012) that eggs and early stage larvae are retained in the Shubenacadie estuary by a 'pump' mechanism generated by relatively less dense freshwater running over more dense seawater seems unlikely in our opinion because the estuary is very shallow and dominated by a bore. For sure, there is good evidence this mechanism functions effectively in relatively deep (25m) and stable (tidal amplitude <20cm) estuaries such as Chesapeake Bay to retain striped bass eggs and larvae within an estuarine turbidity maximum (ETM; Guo and Valle-Levinson 2007; Martino and Houde 2010). In the Shubenacadie estuary on the ebb tide the water depth is less than 1m in many sections, and totally mixed. We have identified sections around Anthony's Nose and Gosse Bridge which are up to 7m deep on the ebb tide where there may be slower moving water, but we don't believe it is possible for an ETM to form or to make a significant contribution to retention. However we remain open-minded, and will continue to further our knowledge of ETMs. A small macrotidal estuary in Wales formed an 'ephemeral' ETM in the summer when freshwater runoff was low at high tide in water depths >4m, but it was destroyed every tide and often did not appear (Jago et al. 2006).

Returning to the 2011 spawning data; the largest spawning event we have witnessed in the past four years was detected early morning May 29. The egg density from the initial sample was very high, >10,000 eggs/m<sup>3</sup> (Fig. 16). Total egg abundance in the main channel was around one million eggs per second at this time-point, but decreased quickly towards the end of the ebb tide indicating we caught the tail-end of a spawning event. The tidal bore arrived at Alton 11:10h sweeping a proportion of eggs back upstream, with high slack around 12:30h. Subsequently the density of eggs peaked at about three hours into the ebb tide (7740 eggs/m<sup>3</sup> at 14:55h), declining to 211 eggs/m<sup>3</sup> at the end of the ebb tide. The bore came in at about midnight, with >1 million eggs per second being carried upstream. At the turn of the tide, most of the eggs appeared at Alton early in the ebb tide,

but the eggs were more dispersed with a peak of around 3000 eggs/m<sup>3</sup>. Egg development stage was varied indicating there were a number of spawning events over the May 29-30 period. Water temperature was relatively high 17 °C, resulting in a hatch time around 48h.

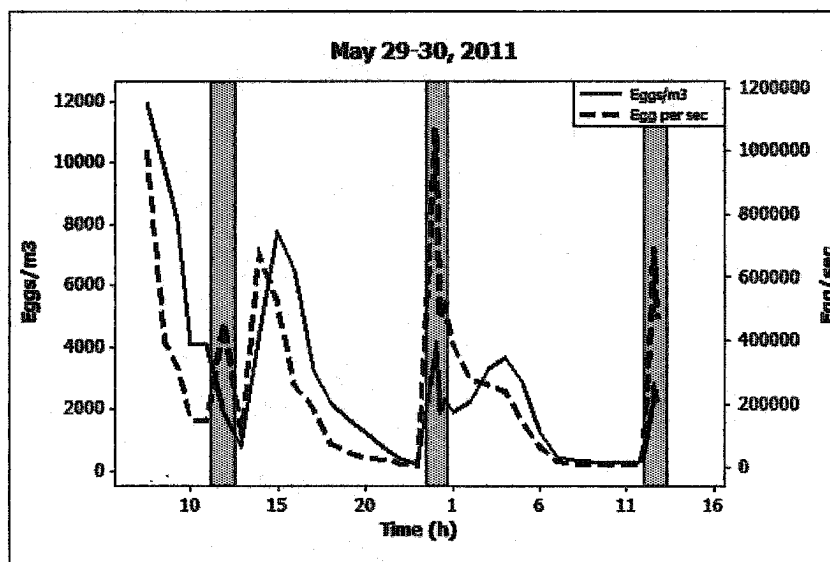


Fig. 16. Striped bass egg density (egg/m<sup>3</sup>) and abundance (eggs/sec) over 30 hours May 29-30, 2011 at the Alton site. Vertical lines and shading indicate the timing of the flood tide (May 29: 11:10h to 12:35h and 23:25h to 00:40h, May 30: 11:55h to 13:15h).

On May 30 on the flood tide around mid-day >600,000 eggs per second were passing the Alton site, three plankton net tows all registering an egg density >2000 eggs/m<sup>3</sup>, 90% of which were 24h old. These eggs would have been swept several kilometers upstream of the Alton site before the tide turned and transported them back downstream. Between 16:00 and 20:00h on May 30 sampling at the estuary mouth revealed large numbers of eggs being flushed out to sea. In Cobequid Bay, egg distribution was patchy, density ranging from 20 to 140 eggs/m<sup>3</sup>. Their developmental stage was the same as eggs collected a few hours earlier on the flood tide at the Alton site, over 30km further south emphasizing their widespread dispersion.

More spawning occurred June 1 and June 2, with the highest egg density at the end of the ebb tide 804 and 3769 eggs/m<sup>3</sup> respectively, this temporal distribution similar to 2008-2010 datasets, but different to the May 22 and May 29, 2011 spawning. Another spawn on June 10 also resulted in egg density at the Alton site being highest at the end of the ebb tide. The change in the timing of peak egg density from early to late in the ebb tide was associated with a spell of dry weather and a substantial decrease in the freshwater runoff. Less freshwater runoff would allow the saltwater to penetrate further

upstream on the flood tide; this in turn might well cause spawning activity to commence further upstream, which in turn would alter the timing of the peak in egg density at Alton. Logging salinity at the spawning grounds around the CN rail bridge would be useful to help define the head-of-the-tide, the upstream limit of spawning activity.

#### 4. *Striped bass larvae*

The density of larvae is typically ten to 100-fold lower than eggs, likely due to mortality and a general dispersion throughout the tidal range of both the Stewiacke and Shubenacadie estuaries and advection into Cobequid Bay. Daily mean density of larvae in 2011 was the highest recorded in the past four years, exceeding 800 larvae/m<sup>3</sup> on June 6 and 11 (Fig. 17 lower panel). By comparison the highest peak recorded in 2008, 2009 and 2010 was 120, 3.5 and 200/m<sup>3</sup> respectively (Fig. 17, 18). The high daily mean density in 2011 was partly due to sampling during the flood tide when large numbers of larvae were caught. Flood-tide sampling was not attempted in 2008-09 due to safety concerns and our lack of experience, and in 2010 was infrequent. But clearly, it is an essential component of future monitoring.

In 2011, larvae were first detected May 27, about a week later than 2010. The low water temperature (11-13 °C) accounted for the five day gap between spawning May 22 and hatch. On June 1, 2011 the density of larvae increased abruptly to 100/m<sup>3</sup> following the hatch of the eggs from the very large spawning May 28-29. Over the next 10 days the daily mean density of larvae at Alton remained high, associated with negligible rainfall and low freshwater runoff (high tide salinity 15ppt). Between June 13 and 16, the density of larvae 'crashed' from 100/m<sup>3</sup> to <3/m<sup>3</sup> (Fig. 11, lower panel). The disappearance of larvae was associated with heavy rain June 13-15 (Stanfield airport: 98.1mm) coinciding with a full moon June 15, and water temperature drop to 10 °C. The huge freshet resulted in the estuary overflowing the bank at high tide June 16. It seems reasonable to conclude that billions of larvae had been flushed downstream out of the estuary. The salinity at high tide at Alton decreased from >15ppt June 15 to <2ppt June 16, and for the next ten days was <5ppt due to the high freshwater runoff. Larvae reappeared at the Alton site on June 22, density 28 larvae/m<sup>3</sup>, and continued to be caught in the plankton net in relatively low numbers through to July 10. Whether the larvae came from upstream or downstream,

we do not know. Over the past four years, the density of striped bass larvae was lowest in 2009, with a single 'peak' of 3.5 larvae/m<sup>3</sup> on June 8 (Fig. 18). That year there appears to be no single major weather event to explain the low number of larvae, but rather the rainfall was above average from March to July resulting in steady high run-off.

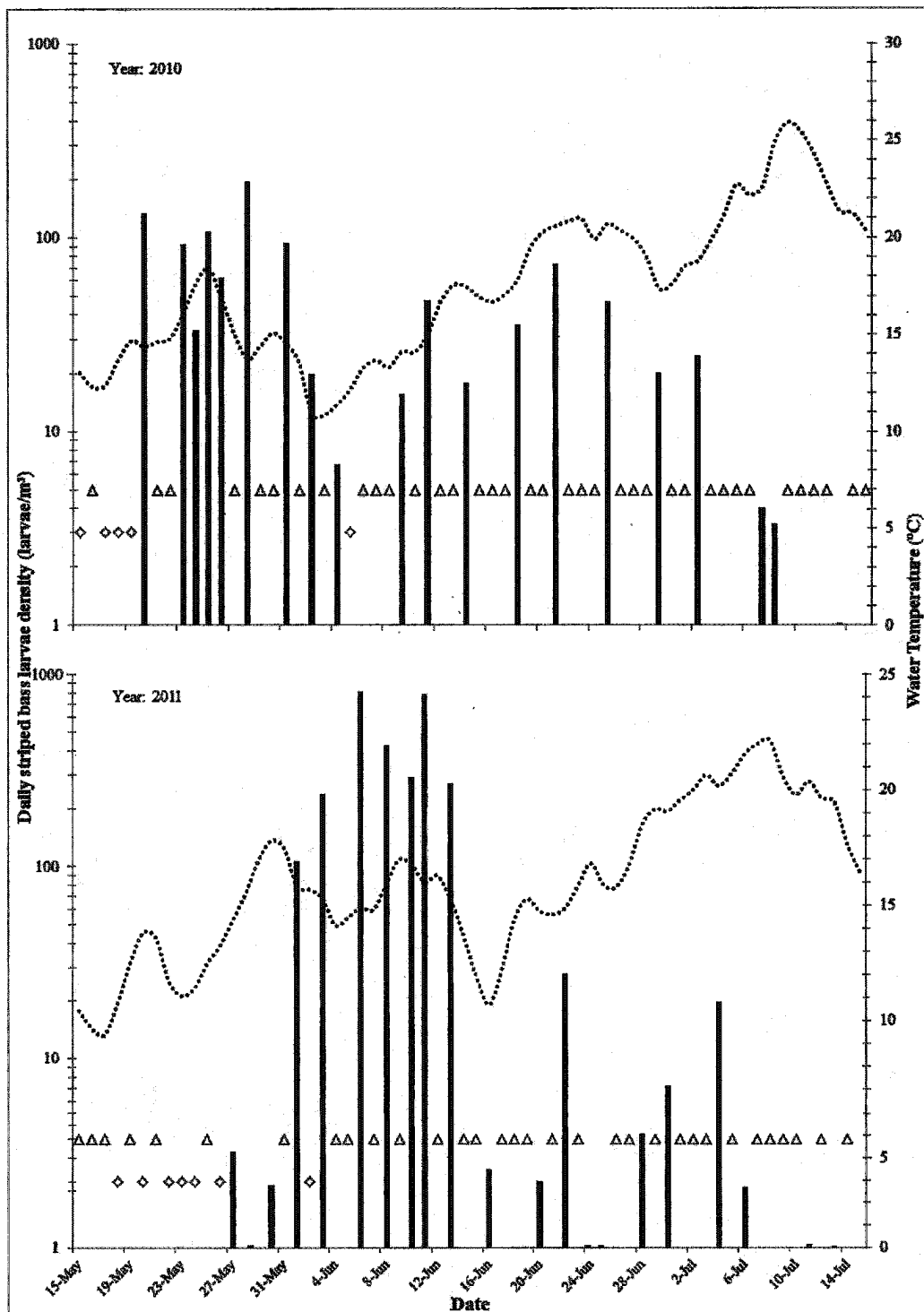


Fig. 17. Striped bass larvae density (bars; total daily mean larvae per m<sup>3</sup> water filtered) at the Alton sampling site in 2010 (top panel) and 2011 (bottom panel). Open diamonds indicate days when sampling was conducted but no larvae were detected, open triangles indicate days when no sampling occurred.

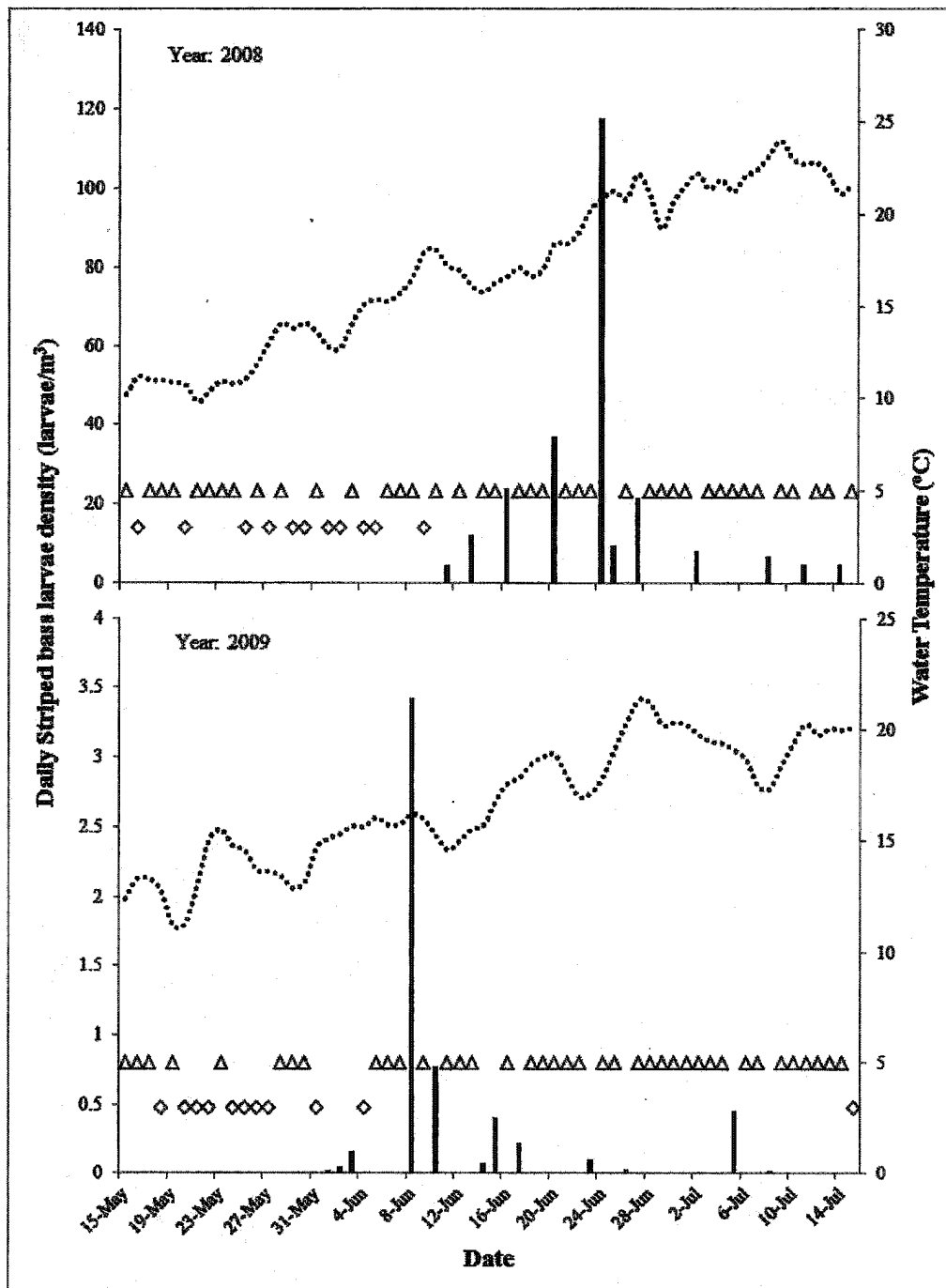


Fig. 18. Striped larvae density (bars; total daily mean larvae per m<sup>3</sup> water filtered) at the Alton sampling site in 2008 (top panel, Y-axis scale 0-140) and 2009 (bottom panel, Y-axis scale 0-4). Open diamonds indicate days when sampling was conducted but no larvae were detected, open triangles indicate days when no sampling occurred. Note the Y-axis scale difference.



A consistent feature of striped bass larvae caught in the plankton net sampling from the main channel from May to early July in 2008 2010 and 2011 was that their body size was around 7mm total length (TL). They had inflated their swim-bladders and were at the first feeding stage. By comparison beach-seine sweeps consistently caught larger larvae during the same time period (Table 2). One explanation is larvae <7mm TL lack the swimming ability to move out of the main channel, whereas larger larvae can swim to the margins where they find refuge in the slower moving water. Sustainable swimming speed of 7mm TL striped bass larvae is around 2cm/second, 9mm larvae around 3cm/second (Meng 1993). A second explanation is larvae >7mm TL have the swimming ability to evade the plankton net. Both explanations may be partially true. The migration of larvae from the main channel to the shallow margins, either actively or passively, we propose is important to the retention of striped bass larvae in the estuary nursery habitat. The concept of the shallows being a microhabitat for early life stages of fish is well established (Baltz et al. 1993; King 2004). The next section of this report provides further support for the hypothesis the microhabitat of the margins is critical to striped bass early life stages.

Table 2. Comparison of total body length (TL, mm) of striped bass larvae caught either by plankton net (0.5m diameter, 500uM mesh) or beach seine (1mm mesh).

2011	Plankton Net			Beach Seine		
Date	n	mean	range	n	mean	range
June 28	46	6.6	6-7	29	7	6-7
June 30	45	6.9	5-9	12	10	8-14
July 4	69	7.1	4-9	7	12.3	11-16
July 28	16	17	11-23	25	19.2	14-33

##### ***5. Striped bass larvae temporal and spatial distribution***

The 2011 sampling season verified the larvae are broadly distributed from Cobequid Bay to several kilometers upstream of the confluence of the Stewiacke and Shubenacadie Rivers. It is becoming clear that upstream transport on the flood tide and downstream advection are in a fine balance, with tides, rainfall and freshwater runoff an important factor affecting retention. The long length of the Shubenacadie-Stewiacke estuary allows retention.

The high daily mean density of  $>800$  larvae/ $m^3$  in early June 2011 was due mostly to large numbers of larvae ( $>2000$  larvae/ $m^3$ ) brought past the Alton site on the flood tide. For example, on June 6 at the end of the ebb tide the density of larvae in the top 1m of the main channel was between 240 and 350 larvae/ $m^3$  at a rate of 100,000 per second (Fig. 19 upper panel). Ten minutes after the bore the density of larvae was 2504 larvae/ $m^3$ , equal to one million larvae per second being transported upstream at around 6km/h. Where did all these larvae come from? Were they occupying the water column immediately downstream (1km or so) of the Alton site, perhaps in the shallows? If this is true, a similar high abundance of larvae should be at the Alton site, since the estuary characteristics seem to be the same along that section of the Shubenacadie. Alternatively, were the larvae from much further downstream and somehow 'surfing' the bore as it moved at 11km/h, and then dropping behind in its wake? Although the flood tide at Alton and upstream last only 1h and 25 minutes as judged from the river bank, the upstream travel time of a parcel of water moving at about 6km/h behind the bore (speed=11km/h) is considerably longer than 85 minutes.

At high slack water on June 6 the density was 2730 larvae/ $m^3$ . On the subsequent ebb tide a large number of these larvae present at Alton at the turn of the tide would have been flushed into Cobequid Bay if they remained in the main channel. Same as eggs, we suggest that larvae drifting or swimming out of the main channel into slow moving water at the margins is a means by which they are retained in the estuary. By contrast, larvae at the Alton site at the end of the ebb tide would be transported upstream on the flood tide into both the Shubenacadie and Stewiacke Rivers and would be easily retained in the estuary. On June 11, the temporal distribution of larvae at Alton was similar to June 6: at the end of the ebb tide about 700 larvae/ $m^3$ , then early on the flood tide a 'pulse'  $>2000$  larvae/ $m^3$  passed upstream which decreased quickly to  $<100$  larvae/ $m^3$  close to high tide (Fig. 19 lower panel).

The upstream transportation and distribution of larvae was investigated on June 3 and June 10 using two boats, one on the Stewiacke River the other on the Shubenacadie River. Plankton net tows were conducted both on the flood tide as each boat travelled upstream, then on the ebb tide, motoring quickly downstream to avoid sampling the same

parcel of water. Striped bass larvae, all around 7mm TL, were in high density on both rivers at least 8km upstream of their confluence on the ebb tide (Table 3 and 4). On June 10 on the Stewiacke River, the high density of eggs on the flood tide was associated with adult fish banging into the underside of the boat suggesting they were in the act of spawning.

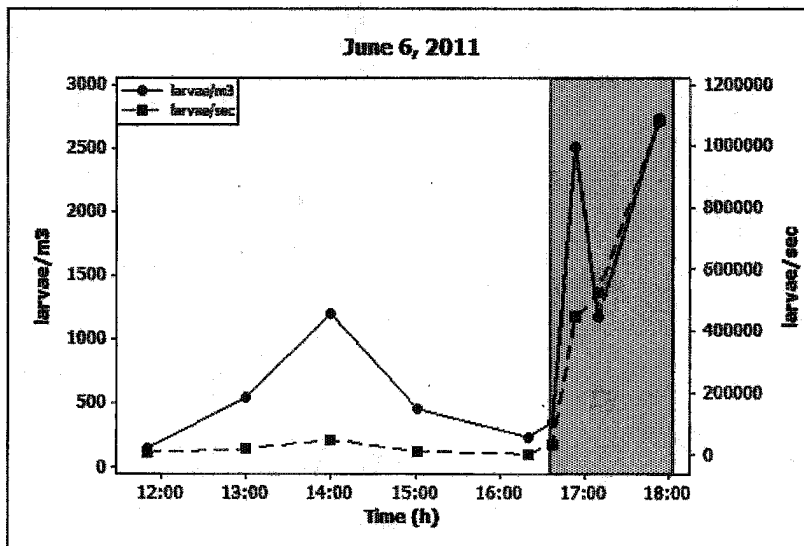


Fig. 19. Larval striped bass density (larvae/m<sup>3</sup>) and abundance (larvae/second) at the Alton site with respect to the tide, June 6 and June 11, 2011. The vertical line and shading indicates the flood tide.

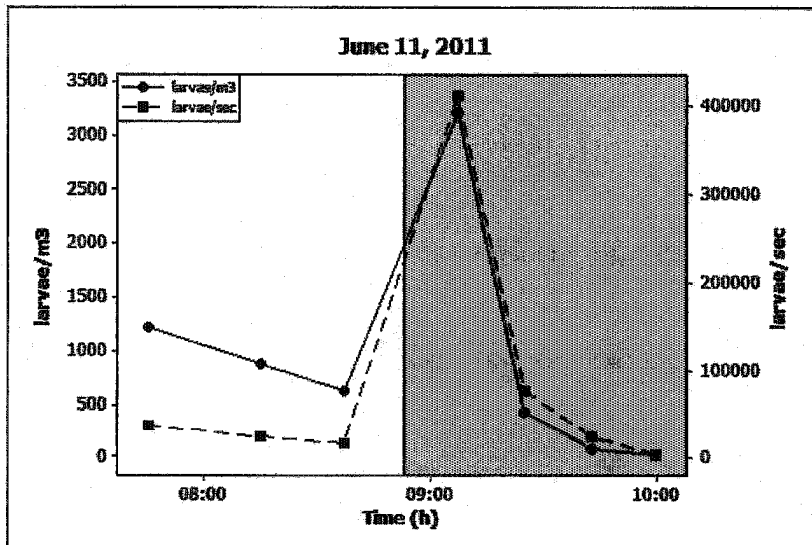


Table 3. Density of striped bass eggs and larvae on June 3, 2011 on the Shubenacadie and Stewiacke rivers during the flood tide and subsequent ebb tide. Kilometers (km) indicate the sample location (Stewiacke: km upstream of Shubenacadie confluence; Shubenacadie: km upstream of estuary mouth. See Fig. 1 for river km details). The relatively low numbers of eggs and larvae caught on the Stewiacke River may be partly due to outboard motor breakdown.

Stewiacke River					Shubenacadie River				
km	Clock time	eggs/m <sup>3</sup>	Larvae/m <sup>3</sup>	Tide	km	Clock time	eggs/m <sup>3</sup>	Larvae/m <sup>3</sup>	Tide
0.6	13:58	0	0	ebb	29	14:53	57	8	flood
0.8	14:21	0	0	ebb	33.7	15:22	0	0.4	flood
1.56	14:59	4	0	flood	38.3	15:44	0	0	flood
2.86	15:14	2	0	flood	40.3	16:00	0	0	flood
5.26	15:41	2	0	flood	41.5	16:08	0	0	flood
6.1	16:01	0	0	flood	41.5	16:18	0	0.1	flood
5.51	16:29	6	0	ebb	40.6	16:32	0	0	flood
4.16	16:52	100	84	ebb	39.6	16:45	0	0.1	ebb
3.86	17:07	76	237	ebb	38.5	16:54	126	17	ebb
3.86	17:22	7	32	ebb	37.4	17:04	404	1112	ebb
1.6	18:05	370	138	ebb	36	17:13	717	2370	ebb
1.2	18:13	310	66	ebb	35	17:20	2122	1532	ebb
-	-	-	-	-	33.8	17:32	2193	729	ebb
		END			32.3	17:38	678	277	ebb
					31.3	17:46	989	440	ebb
					29.3	17:59	459	242	ebb
					26.3	18:06	971	113	ebb

Table 4. Density of striped bass eggs and larvae on June 10, 2011 on the Shubenacadie and Stewiacke rivers during the flood tide and subsequent ebb tide. Kilometers (km) indicate the sample location (Stewiacke: km upstream of Shubenacadie confluence; Shubenacadie: km upstream of estuary mouth. See map for river km details)

Stewiacke					Shubenacadie				
km	Clock time	eggs/m <sup>3</sup>	Larvae/m <sup>3</sup>	Tide	km	Clock time	eggs/m <sup>3</sup>	Larvae/m <sup>3</sup>	Tide
0.6	07:45	11235	62	flood	25	07:41	874	435	flood
0.6	07:56	3217	28	flood	30.2	08:28	57	407	flood
1.3	08:22	4194	130	flood	32.5	08:58	51	70	flood
4.1	08:42	2365	443	flood	39	09:15	0	5	flood
8.7	09:11	47	0	flood	39	09:24	25	3	flood
11.1	09:26	0	0	ebb	40.1	09:35	7	0	flood
9.7	09:58	0	0	ebb	41.3	09:46	9	3	flood
8.7	10:09	0.0	0.7	ebb	42.3	10:05	3	0	flood
7.6	10:21	867	58	ebb	43.9	10:18	0	0	flood
5.2	10:41	873	921	ebb	44.5	10:30	0	0	flood
3.8	10:56	740	966	ebb	42.4	10:55	0	0	ebb
2.1	11:06	482	965	ebb	40.4	11:10	0	0	ebb
0.6	11:16	429	494	ebb	38.8	11:23	167	6	ebb
0.6	12:07	505	347	ebb	37.3	11:37	98	128	ebb
0.6	12:44	1144	815	ebb	36.1	11:46	164	578	ebb
0.6	13:25	1669	307	ebb	35.1	11:55	519	1391	ebb
-	-	-	-	-	34	12:05	575	601	ebb
		END			33	12:12	281	1525	ebb
					32	12:20	129	789	ebb
					31	12:27	177	479	ebb
					29	12:39	161	557	ebb
					25	13:05	211	180	ebb

Both larvae and eggs shared the same temporal and spatial distribution indicating the mechanism controlling their position is the same, namely passive transportation. The general pattern of abundance of eggs and larvae was the same in both rivers and on both June 3 and June 10. Immediately behind the bore past the density of eggs and larvae was relatively high, but decreased over successive samples, despite both boats moving upstream. The results suggest there is a concentrated 'pulse' of eggs and larvae travelling upstream early in the flood tide, whereas water later in the flood contains very few striped bass. The possibility the eggs and larvae were settling and being missed by the plankton net has to be rejected because the turbulence was high. At the turn-of-the-tide, and the return trip downstream the density of larvae and eggs increased greatly (Table 3 and 4). The data are difficult to interpret because the sampling varied in both time and space. A better approach would be to have two boats operate on the same river and sample from two fixed locations about 5km apart.

Downstream transport of striped bass larvae and advection into Cobequid Bay was first reported in 2010 and confirmed in 2011. After the heavy rain event June 15, sampling was conducted on the same day at both Alton and close to the estuary mouth at Black Rock. On June 22 at Alton on the ebb tide (ebb started 07:28h), larvae at a density of 30 to 38/m<sup>3</sup> drifted past the site steadily for two hours (09:30 to 11:20h, salinity <1ppt). At Black Rock between 13:12h and 15:23h (mean salinity 8ppt) there was a consistent steady flow of larvae at a density of between 17 and 40/m<sup>3</sup>. The body size of the larvae caught at both sites was the same, 7mm TL. All of these larvae would have been transported into Cobequid Bay. Their chances of survival are unknown, but Cobequid Bay is likely less suitable than the estuary as a nursery habitat, as it has higher salinity and lower water temperatures (Stone, 1976). Certainly, a proportion of the larvae would be swept back into the Shubenacadie on the next flood tide.

#### ***6. Striped bass growth, juveniles and otoliths***

Up to July 1 in each year 2008-2011, most of the striped bass caught were larvae around 7mm total length (Fig. 20). We do not know whether this apparent lack of growth in June was real, due to poor feeding conditions, or an aberration due to failure of the

plankton net to catch larger fish, or that larger fish had migrated out of the main channel. By early July 2011 the body size of fish ranged from 5 to 15mm TL. Growth rate during July and August 2011 was considerably poorer than both 2010 and 2008 due to relatively low water temperatures (Table 5). The end of August mean body size of YOY in 2011 was around 40mm, compared to close to 80mm in 2010. The relative abundance of YOY striped bass was the same in 2010 and 2011 at the Alton site, with an average of 14 bass caught per beach-seine haul (Table 6). YOY were widely distributed, caught both upstream (Hwy102 bridge) and downstream (Black Rock, Princeport), although the relative abundance at these sites was lower than at Alton. The total number YOY caught in 2010 and 2011 was 924 and 784 respectively. Most were returned unharmed, 285 were euthanized for analysis of body size, stomach content, and aging by means of extraction of otoliths and counting daily growth rings. Otoliths were taken from 80 YOY caught between July 11 and August 31. Of these, the growth rings were counted on 37 of the smaller fish (11-20mm TL) by one person (Zhuhui Ye). The estimated hatch date based on otolith analysis was broadly spread between May 20 and June 13 (Table 7). There was no evidence timing of hatch affected the relative abundance of this small sample of fish. The otoliths from larger fish caught in August (24-70 mm TL; n=43) were too thick to see the growth rings. These otoliths have been stored and we plan to process them in 2012 using a Buehler isomet saw loaned from DFO (R. Bradford DFO, pers. comm.).

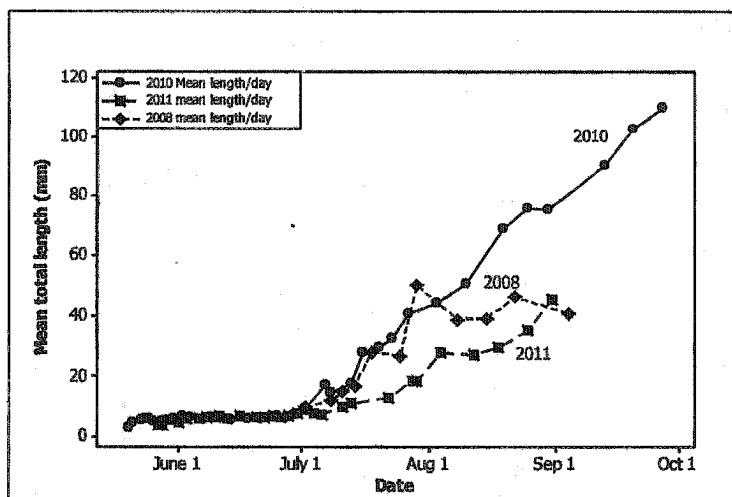


Fig. 20. Mean body length of striped bass larvae and young of the year in the Shubenacadie River estuary over three years. In 2009 very few larvae were caught.

Table 5. Total monthly rainfall 2008-11 at Stanfield airport weather station, and mean monthly temperature of the Shubenacadie River recorded by loggers at the Alton river site, with some data from the lower Stewiacke River.

Month	Rainfall (mm)				Temperature (°C)			
	2008	2009	2010	2011	2008	2009	2010	2011
April	64	159	38	124.2	*	*	*	*
May	159	89	48	124.2	11.6	13.3	14.6	10.6
June	69	150	100	144.3	17.5	17.3	16.6	13.7
July	80	71	126	94.5	22.5	20.1	22.2	18.8
Aug	287	180	65	130.1	19.5	22	22.2	18.6
Sept	118	73	118	41.3	16.1	14.9	18.6	*
Oct.	85	167	150	335.9	12.2	10.4	14	*

Table 6. Number of YOY striped bass caught by beach seine net at the Alton river site 2010 and 2011. CPUE=catch per unit effort (unit=1sweep)

Month	2010			2011		
	Number caught	Number of tows	CPUE	Number caught	Number of tows	CPUE
June	0	3	0	71	13	5
July	482	14	34	403	20	20
Aug	72	15	5	135	10	14
Sept	6	8	1	*	*	*
Totals	560	40	14	609	43	14

Table 7. Estimated hatch date as judged by otolith daily growth rings of YOY striped bass caught July 11 to July 31, 2011 in the Shubenacadie River

Hatch Date	Number of fish	% of total
May 20-24	7	19
May 25-29	9	24
May 30-June 3	5	13
June 4-8	7	19
June 9-13	8	22
June 14-18	1	3
Total	37	100



## **7. Recruitment**

We estimate recruitment in 2011 will be lower than 2010 and similar to 2008, based on YOY body size in late summer. The lowest year over the past four was 2009. Striped bass eggs were plentiful that year, but larvae were extremely rare. The cause of the high mortality in 2009 is not apparent from the temperature and rainfall data. DFO survey of YOY abundance data also show 2009 was a bad recruitment year (Bradford and LeBlanc 2012). Four-years of monitoring has allowed us to document relatively high egg production each year, but relatively large inter-annual variation in the abundance of larvae and the growth rate of juveniles. Environmental factors appear to be the principal factor affecting year-class strength. Cold weather in May-June can delay spawning season, heavy rain in June can increase advection, cold weather in July and August reduces growth rate of juveniles. The current high number of spawning adults is due to high recruitment of the 1999 year-class (Bradford and LeBlanc 2012). High recruitment in 1999 was associated with low rainfall April to July (Fig. 21) and above average temperatures during May and June beneficial to first feeding larvae, and also a warm September, extending the growing season for juveniles (Fig. 22). Striped bass in the Hudson River exceeding 10cm fork length by the end of the first growing season have a good chance of surviving winter and being recruited (Hurst and Conover 1998). The same '10cm rule' seems to hold true for Maritime striped bass (R. Bradford pers. comm.). In the long run, if global warming results in milder spring weather for Nova Scotia then the chances of better recruitment among Shubenacadie striped bass could be improved, but only if the rain holds off.

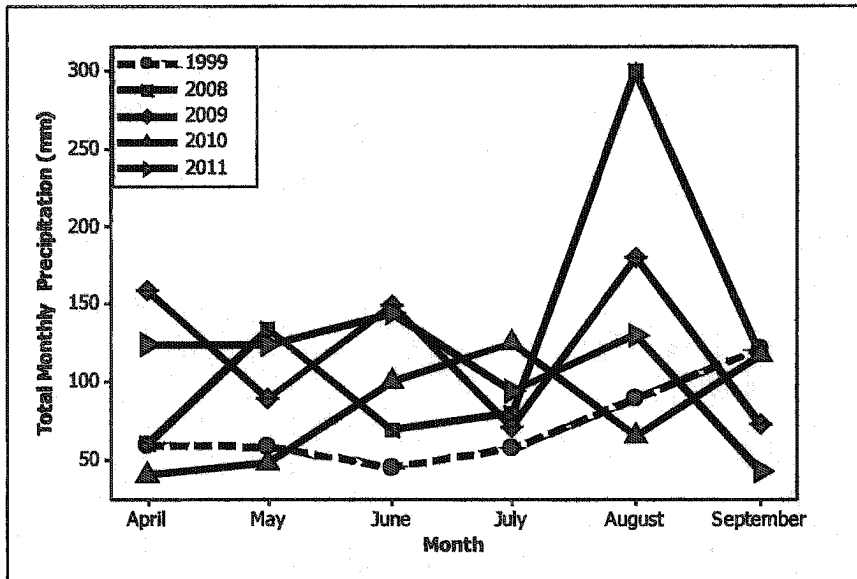


Fig. 21. Total monthly precipitation (Stanfield Airport weather station), from April to September, in 1999 and 2008-2011. The dotted line indicates the dry spring and summer in 1999.

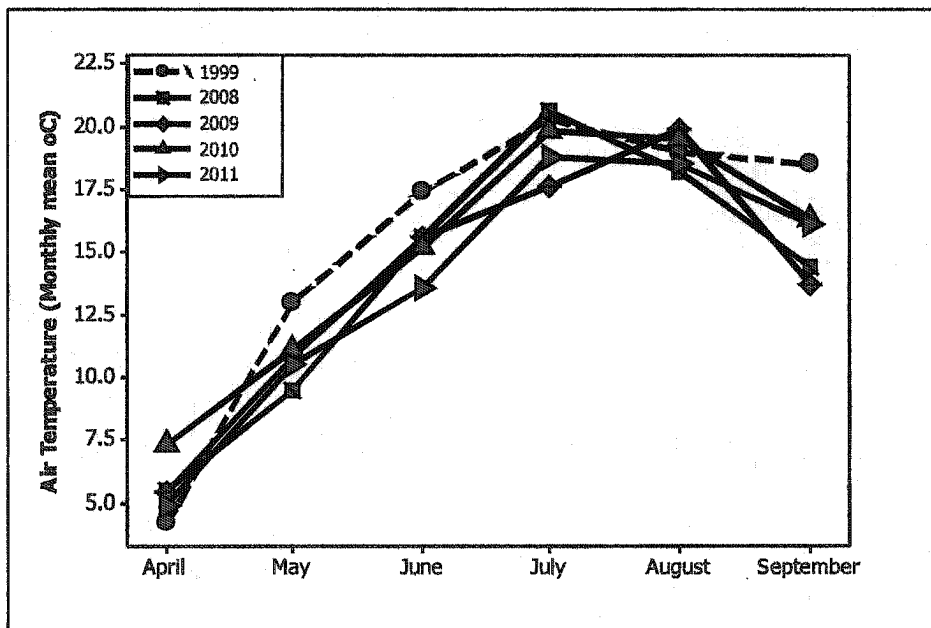


Fig. 22. Mean average monthly air temperature recorded at Stanfield airport weather station in 1999 and 2008-2011. The dotted line indicates the relatively warm weather in May, June and September 1999.

## 8. *Mysids*

The 'opossum shrimp' *Neomysis americana* were again the highest density prey item collected in the plankton net this season. However, on average, mysids were more than twice as abundant in 2010 compared to 2011 (Fig. 23). This density difference may have been associated with the salinity difference between years. In 2010 the average salinity while taking plankton net tows was 8.5 ppt, compared to 3.8 ppt in 2011. The 2011 striped bass stomach content analysis verified that mysids are an important prey item for Shubenacadie river striped bass. Mysids became commonly found in striped bass stomachs when the fish reach 20-50 mm TL and remain an important prey item though the summer season.

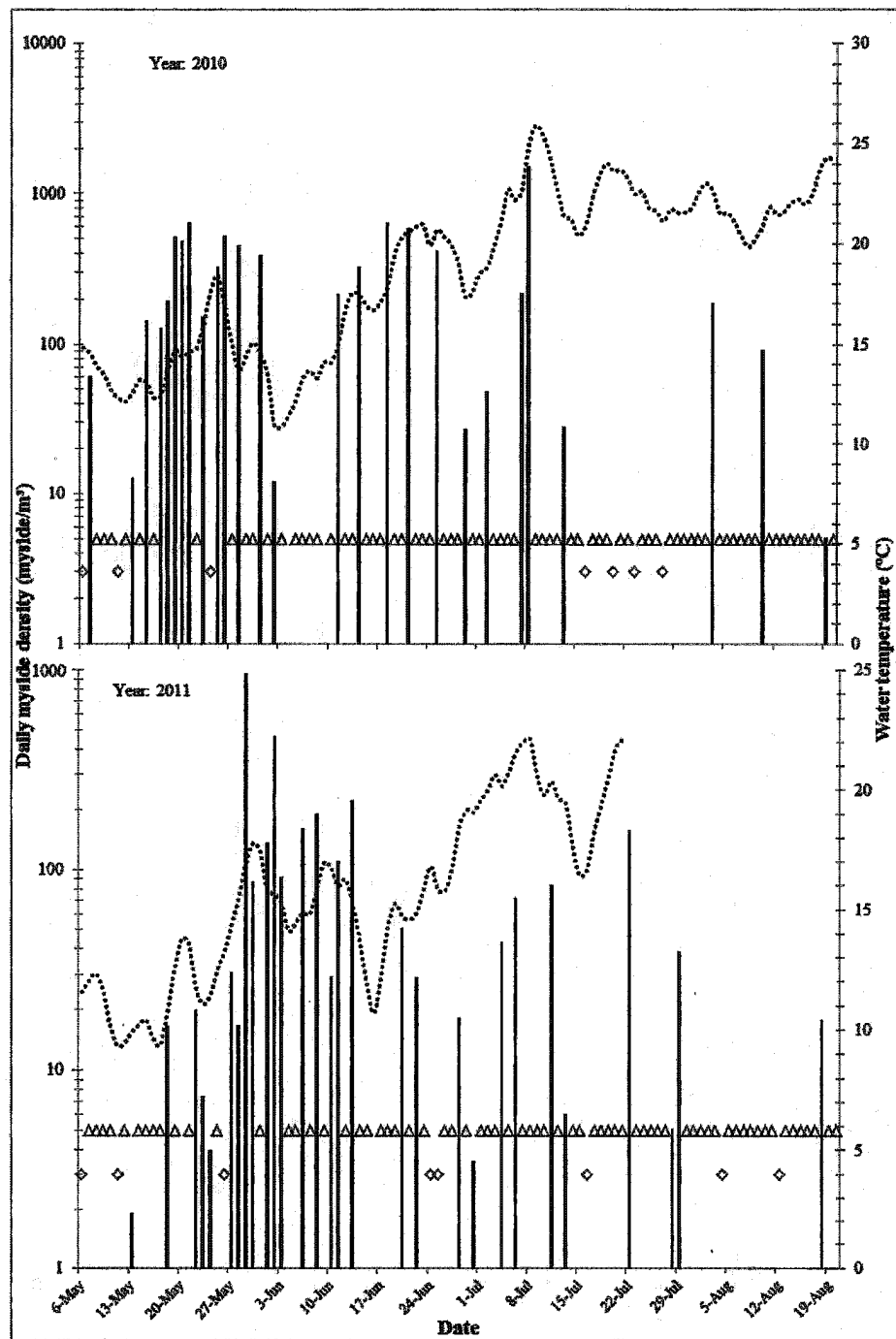


Fig 23. Mysid daily average density (mysids/m<sup>3</sup>) in 2010 (upper panel) and 2011 (lower panel). Open diamonds indicate days when sampling was conducted but mysids were not detected, open triangles indicate days when no sampling occurred.

## **Conclusions**

1. Egg densities per m<sup>3</sup> water filtered in 2011 were the highest in the past four years.
2. 22 billion eggs were estimated to pass down the main channel of the estuary. The main channel comprises about 30% of the cross-sectional area of the river. Billions of other eggs were outside of the main channel.
3. 22 billion eggs represents about 24,000 females based on an average fecundity of 900,000 eggs per female.
4. Large scale upstream passive transport of eggs and larvae on the flood tide was recorded.
5. Advection into Cobequid Bay was verified for both eggs and larvae.
6. A heavy rain event in mid-June perfectly demonstrated the critically important effect of freshwater runoff on abundance of larvae.
7. A cold wet summer resulted in relatively poor growth of YOY striped bass, we expect lower recruitment in 2011 than 2010.

## **Acknowledgements**

Robert Schicht and Zhuhui Ye provided excellent technical support. Thanks to John McCabe (NS. Dept. Public Works) for sonar installation and operation. The Natural Sciences and Engineering Research Council provided financial support to both G. Stewart and R. Schicht.

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**Title:** Shubenacadie River - water withdrawal and effluent release and natural gas storage  
**PATH File No:** 06-HMAR-MA7-00182  
**Habitat File No:** 06-W7-182

**Receive Date:** 2006/08/11

67

**Activity:**

**Action ID No.:**

**To**  
**From:**

July 03, 2012  
June 21, 2012

**Correspondence - Do not go to Macro Access Screen**

**Action Date:**  
**Document Date:**

**Description:**

File has been placed on hold and will be reassigned once further workactions are required. The hard copy files are presently in Melanie's office on top of the bookcase.

See background emails below.

Melanie

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**From:** McAllister, Kurt D  
**Sent:** June 21, 2012 3:17 PM  
**To:** Humphrey, Donald  
**Cc:** MacLean, Melanie A (Habitat)  
**Subject:** RE: Alton Natural Gas Storage Project (06-W7-182)

We can take it- just put it on Hold in PATH and put a note to file that states the Files are with Melanie so that when it gets re-assigned the new Bio will know where the hardcopy is once something comes in.  
Kurt

---

**From:** Humphrey, Donald  
**Sent:** June 21, 2012 3:09 PM  
**To:** McAllister, Kurt D  
**Subject:** FW: Alton Natural Gas Storage Project (06-W7-182)

Hi Kurt,

Is this something that someone from your shop could put on their plate since Melanie should be focusing her efforts on SARA and FCSAP related work? It doesn't sound like there is much happening at the present time with the file but could become more active down the road?

If you have someone in mind, I will ask that the file be reassigned and that Melanie drop the paper file off to one of your staff.

Thanks, Donald

---

**From:** MacLean, Melanie A (Habitat)  
**Sent:** June 21, 2012 2:00 PM  
**To:** Humphrey, Donald  
**Subject:** Alton Natural Gas Storage Project (06-W7-182)

Warning: Information in PATH may be private and/or sensitive and should not be shared without appropriate consultation and/or permission. Refer to the Data and System Security section of the PATH Helpfiles for details



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Hi Donald.

In follow up to our conversation, I was wondering if the Alton Natural Gas Storage Project referral could be reassigned to someone in the Freshwater Protection Section taking into consideration:

- 1) my present workload associated with the DFO FCSAP Coordinator and HMP SARA Coordinator responsibilities, and
- 2) although the project is presently on hold (baseline date collection is ongoing) there is a possibility (depending on market conditions) that the creation of the storage caverns could be initiated later this year so workload associated with this referral could increase.

The PATH number for this file is 06-W7-182 with the title "Shubenacadie River - water withdrawal and effluent release and natural gas storage".

I will hold off sending you my completed work objectives until you advise whether or not I will be keeping the Alton file.

Thanks.

Melanie

**Melanie Fleming** (previously MacLean)

**DFO FCSAP Coordinator/HMP SARA Coordinator**

Habitat Management Division | Division de la gestion de l'habitat

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2

Tel | Tél: (902) 426-8033 Fax | Téléc: (902) 426-1489

Email | Courriel: [melanie.a.macleam@dfo-mpo.gc.ca](mailto:melanie.a.macleam@dfo-mpo.gc.ca) <<mailto:melanie.a.macleam@dfo-mpo.gc.ca>>

Title: PATH File No:	Shubenacadie River - water withdrawal and effluent release and natural gas storage 06-HMAR-MA7-00182	Habitat File No: 06-W7-182	Receive Date: 2006/08/11
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Action: No Change/No Action Required for this Activity

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

66

July 03, 2012

Action ID No.:  
Action Date:  
Document Date:

Note to File

Activity:  
To  
From:

Description:  
Status has changed from: Active To On Hold  
By: MacLean, Melanie

Action:  
No Change/No Action Required for this Activity  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

70

March 27, 2014

Action ID No.:  
Action Date:  
Document Date:

Note to File

Activity:  
To  
From:

Description:  
File has been placed with other files. No longer in Melanie's office.

Action:  
No Change/No Action Required for this Activity  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

71  
April 30, 2014

Action ID No.:  
Action Date:  
Document Date:

Note to File

To  
From: Delaney, Leanda  
Fleming, Melanie

Description: Assessor has been changed from: Fleming, Melanie To Delaney, Leanda

Action: Q Lead Assessor Changed {x}

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

69

Action ID No.:  
Action Date:  
Document Date:

June 28, 2011  
May 18, 2011

Note to File

Activity:  
To  
From:

Description:  
Received a hard copy of the 2010 annual report on sampling.  
Action:  
Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

74

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

August 05, 2014

To

Birkett, David

Action Date:

August 05, 2014

From:

Delaney, Leanda

Document Date:

Description:

Ecosystem Management  
Fisheries and Oceans Canada / Pêches et Océans Canada  
1 Challenger Dr. P.O. Box 1006, Station B610  
Dartmouth, Nova Scotia, B2Y 4A2

Your file

Votre référence

August 1, 2014

Our file

Notre référence

06-HMAR-MA7-00182

David Birkett

AltaGas Natural Gas Storage Ltd.

1700, 355 4th Ave SW

Calgary, Alberta T2P 0J1

Dear Mr. Birkett:

**Subject: Review of Alton Natural Gas Estuary Monitoring Plan - condition of the Nova Scotia Environmental Assessment and Fisheries and Oceans Canada**

The Fisheries Protection Program (The program) of Fisheries and Oceans Canada (DFO) received the proposed Alton Gas Estuary Monitoring Plan on June 18, 2014.

Our review consisted of:

- Alton Natural Gas Estuary Monitoring Plan submitted by the consultant, Mr. Bob Rutherford, Thaumus Environmental Consultants Ltd. on June 18, 2014.
- DFO letter of advice drafted by Melanie McLean, Habitat Assessment Biologist and submitted to AltaGas Natural Gas Storage Ltd. (formerly Alton Natural Gas Storage LP- the proponent) on November 5, 2010.
- Nova Scotia (NS) Environment Assessment Supplemental Information Application to develop natural gas storage caverns in Shubenacadie, NS by the proponent, received on November 23, 2007.

DFO participated in the Nova Scotia Environmental Assessment of the proposal submitted by the proponent to develop natural gas storage caverns in 2007. Condition 2.1 of the NS Environmental Assessment Approval dated December 18, 2007, stipulated the proponent was to provide monitoring programs and plans to the Nova Scotia

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Environment (NSE) and DFO for review. Also, based on the outcome of the monitoring program, the proponent was to make modifications to the mitigation plans and/or operations to prevent any unacceptable environmental effects.

Monitoring programs A, C and D, listed in Attachment 1 were developed between DFO and the proponent and were administered from 2008 to 2013. The purpose of this proposed plan titled: 'Alton Natural Gas Estuary Monitoring Plan' [herein referred to as the Monitoring Plan] submitted on June 18, 2014 was to take the results from the monitoring programs and make modifications to mitigation plans and/or operations to prevent continuing unacceptable environmental effects to the satisfaction of NSE and DFO. The plan was also developed to satisfy conditions, B and E of Attachment 1.

Upon review of the proposed Monitoring Plan, it is recommended a study be completed to determine the median toxicity threshold (LC50) of the brine water and its constituents from the brining operation on egg, larvae and juvenile Stripped bass survival. Based on the results of this toxicity study, modifications to the mitigation measures may be required.

The results of the toxicity study, including possible additional mitigation measures, and design revisions are to be implemented as per the Monitoring Plan and should be provide to DFO for review once available.

If the proponent has any questions, please contact Carol Jacobi at our Dartmouth, NS office at (902) 426-2545, by fax at (902) 426-1489, or by email at Carol.Jacobi@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Mark McLean  
A/ Manager, Regulatory Reviews  
Fisheries Protection Program

COPY LIST: Helen MacPhail, Nova Scotia Environment  
Carol Jacobi, FPP



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

0.00

Species at Risk:

Time Spent (Hrs):

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

73

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

August 05, 2014

To:

Rutherford, Bob

Action Date:

August 05, 2014

From:

Delaney, Leanda

Document Date:

Description:

**Attachments have been saved to W drive**

**From:** Delaney, Leanda

**Sent:** August-05-14 9:07 AM

**To:** Birkett, David; MacPhail, Helen (MACPHAFH@gov.ns.ca) (MACPHAFH@gov.ns.ca); Bob Rutherford

( [REDACTED] )

s.19(1)

**Cc:** Jacobi, Carol; McLean, Mark G

**Subject:** Approval of proposed monitoring program

Hello David et al, please find attached DFO's approval of the Alton Natural Gas Estuary Monitoring Plan submitted to DFO on June 18, 2014 by Bob.

If you would like to discuss please contact Carol Jacobi at [Carol.Jacobi@dfo-mpo.gc.ca](mailto:Carol.Jacobi@dfo-mpo.gc.ca) <<mailto:Carol.Jacobi@dfo-mpo.gc.ca>> or at (902) 426-2545. I will be on an acting assignment till the end of March 2014.

Helen, I have attached a copy of the proposed monitoring program

Kind regards,

**Leanda Delaney, M.Sc.**

**A/ Species at Risk Senior Biologist**

*Ecosystem Management/Gestions des écosystèmes*

*Fisheries and Oceans Canada/Pêches et Océans Canada*

*Tel/ tél: 902-426-1642*

*Fax/ téléc: 902-426-1489*

*Email: [Leanda.Delaney@dfo-mpo.gc.ca](mailto:Leanda.Delaney@dfo-mpo.gc.ca) <<mailto:Leanda.Delaney@dfo-mpo.gc.ca>>*

*1 Challenger Dr / 1 promenade Challenger*

*P.O. Box/C.P. 1006, Station B610*

*Dartmouth, NS/NE B2Y 4A2*

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Action: Information Provided  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

72  
August 05, 2014  
June 18, 2014

Action ID No.:  
Action Date:  
Document Date:

Note to File

Activity:  
To  
From:

Description: Proposed monitoring program received from Bob Rutherford has been saved to W drive

Action: Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

75  
October 15, 2014

Action ID No.:  
Action Date:  
Document Date:

Note to File  
Jacobi, Carol  
Delaney, Leanda

Assessor has been changed from: Delaney, Leanda To Jacobi, Carol

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Ω Lead Assessor Changed {x}

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

76  
October 17, 2014  
October 17, 2014

Action ID No.:  
Action Date:  
Document Date:

Meeting

Activity:  
To  
From:

Description: Attended a technical meeting with KMK, Sipekne'katik First Nation, NS Environment and NS Aboriginal Affairs. KMK and Sipekne'katik concerned DFO not part of the consultation process. Explained there were no permits or authorizations, therefore no way to compel the proponent to address any potential FN issues. NS does have permits and land access, therefore would undertake consultation and DFO would provide technical info.

Action: Aboriginal Communications

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

8.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Action ID No.: 80  
Action Date: April 01, 2015  
Document Date:

Note to File

Activity:  
To  
From:

Description:

Thanks. I'll update RDGO. Do we have media lines on this? Most inquiries would presumably be referred to the prov but if they ask specifically about our advice we might need to say something D.

Sent from my BlackBerry 10 smartphone on the Rogers network

**From:** McLean, Mark G **Sent:** Wednesday, April 1, 2015 5:12 PM **To:** Millar, David C **Cc:** MacNeil, Jack **Subject:** FW: Request for Proposal - Third Party Review of Alton Natural Gas LP Brine Storage and Discharge Facility

David:

As mentioned, attached is the RFP. There is mention of DFO, specifically, "During formal consultation with the Province of Nova Scotia, the Mi'kmaq of Nova Scotia raised numerous questions and significant concerns about the analysis and conclusions of the proponent and Fisheries and Oceans Canada in relation to potential impacts to the Shubenacadie River, specifically to fish and fish habitat."

The closing date is April 17, with an award date of April 27 and 90 day period for completion

Mark

**From:** Dera, Beata E [<mailto:Beata.Dera@novascotia.ca>]  
**Sent:** April 1, 2015 4:57 PM

**To:** MacPhail, Helen; Hines, Samantha E; Bekkers, Kevin F; Weseloh McKean, Sean; Skinner, Bradley; Brenton, Jay; Blakeney, Josh G; McLean, Mark G; Bird, Michael W; Fairbairn, Heather J; 'MT.Grant@ec.gc.ca'; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; Potter, Heather L  
**Subject:** FW: Request for Proposal - Third Party Review of Alton Natural Gas LP Brine Storage and Discharge Facility

FYI as discussed at today's meeting, please find attached the RFP sent out yesterday by the Mi'kmaq for the third party review.

Thank-you  
Beata

Attachment not saved on PATH drive.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

**Beata Dera**

*Senior Consultation Advisor*

*Nova Scotia Office of Aboriginal Affairs*

**From:** Crystal Dorey

**Sent:** Tuesday, March 31, 2015 11:36 AM

**Cc:** Twila Gaudet; Michael Cox

**Subject:** Request for Proposal - Third Party Review of Alton Natural Gas LP Brine Storage and Discharge Facility

Good Morning,

Please find attached a Request For Proposals to complete a Third Party Review of the Alton Natural Gas LP Brine Storage and Discharge Facility. Proposals are due by **April 17, 2015** and KMKNO will be available to answer questions and provide additional information to inform the proposal development until **April 10, 2015**. A version can also be found on our website at: [<http://mikmagrights.com/about-us/job-opportunities/>](http://mikmagrights.com/about-us/job-opportunities/)

Once proposals are received, KMKNO will evaluate the merits of each proposal and award the contract shortly thereafter. KMKNO thanks all interested parties for participating but only the successful candidate will be advised, in writing, once the evaluation and selection is completed.

For further information, please contact Twila Gaudet at [twilagaudet@mikmagrights.com](mailto:twilagaudet@mikmagrights.com) or [<mailto:twilagaudet@mikmagrights.com>](mailto:twilagaudet@mikmagrights.com)

Sincerely,

**Crystal Dorey**  
*Communications Officer*

Kwilmu'kw Maw-klusuaqn Negotiation Office



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Mikmaq Rights Initiative  
75 Treaty Trail  
Truro, NS B6L 1W3

Phone: 902.843.3880  
Cell: 902.957.0549  
Fax: 902.843.3882

[<crystaldorey@mikmagrights.com>](mailto:crystaldorey@mikmagrights.com)  
[<https://twitter.com/MikmagRights>](https://twitter.com/MikmagRights)

[<www.mikmagrights.com>](http://www.mikmagrights.com)

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Action:

Information Provided

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

0.00

Time Spent (Hrs):

Authorization Rationale:

Attachment not saved on PATH drive.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

81

Activity: Note to File  
To: Action ID No.:  
From: Action Date:  
Document Date:

April 07, 2015

Description: This include a list of items provided and other useful information

**From:** MacPhail, Helen [<mailto:Helen.MacPhail@novascotia.ca>]  
**Sent:** April 1, 2015 3:16 PM  
**To:** McLean, Mark G  
**Subject:** Response to KMK

Mark,

Attached is a copy of the letter as requested

Attachment not saved on PATH drive.

Regards,

*HelenMacPhail*

Environmental Assessment Supervisor  
**Environmental Assessment Branch**  
Nova Scotia Environment  
1903 Barrington Street  
Suite 2085  
PO Box 442  
Halifax, NS B3J 2P8  
Tel 424-3960  
Fax: 424-6925

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

78

Action ID No.:  
Action Date:  
Document Date:

April 07, 2015

Note to File

Activity:  
To  
From:

Description:  
Status has changed from: On Hold To Active  
By: MacNeil, Jack

Action:  
No Change/No Action Required for this Activity  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:  
0.00

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

77

April 07, 2015

Activity: Note to File  
To: MacNeil, Jack  
From: Jacobi, Carol

Action ID No.:  
Action Date:  
Document Date:

Description: Assessor has been changed from: Jacobi, Carol To MacNeil, Jack

Action:  $\Omega$  Lead Assessor Changed {x}  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

82

Activity: Correspondence - Do not go to Macro Access Screen  
To: McLean, Mark  
From: MacPhail, Helen  
Description: Hello All,

Action ID No.:  
Action Date:  
Document Date:

April 24, 2015

Just to let you know that we will be having a meeting on Wednesday, April 29 from 1.00 pm till 3.00 pm in 18C Barrington Tower.

I have attached two letters that I received from Sipek requesting information on the project. I have also attached a letter from Alton to our Minister requesting an extension to the commencement of work, and alteration of a condition re timing of clearing and grubbing for the Gas Pipeline Project.

We can discuss further on Wednesday but in the meantime, if you have any questions, do not hesitate to contact me

Regards,

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:  
Time Spent (Hrs):  
Authorization Rationale:

0.00

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

83

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

Action Date:

April 27, 2015

To:

MacPhail, Helen

Document Date:

From:

McLean, Mark

Description:

Helen:

I have a conflict for this Wednesday's meeting but Jack will attend for DFO. The only item for DFO was a request from KMK through Beata on the two items from the DFO Science response

In the Canadian Science Advisory Secretariat Science Response 2007/013 "Scientific Review of the Environmental Registration Document for the Proposed Alton Natural Gas Storage Project", it was noted that: *It is suggested that the simplest and safest recourse is not to allow activities associated with the dilution and discharge of brine to take place during the striped bass spawning season. Late April to early July is a sensitive period for most of the other local populations of diadromous fish species, for spawning (e.g., alewife, blueback herring, American shad, Atlantic silversides, rainbow smelt), for outmigration (e.g., inner Bay of Fundy Atlantic salmon smolts), or recruitment to the river (e.g., American eel elvers).*

This suggested mitigation was based on the limited information on the impacts to water quality provided in the EA document, as noted in the 2007 Science Review. "There are a number of information gaps within the Environmental Registration document that, if filled, would be helpful in the determination of potential impacts to fish and fish habitat [emphasis added]. These include the expected chemical composition of the discharge brine relative to the natural range in the chemical composition [emphasis added] of the estuarial water at the proposed project discharge location"

The monitoring conducted since the EA registration has documented the natural range of salinity and temperatures near the proposed project site and the distribution of Striped bass eggs and larva relative to the proposed site and salinity and temperatures levels naturally occurring in the area. This has shown that eggs and larva are exposed to a range of salinities (up to 28ppt) without any impact. The proponent has made commitments, which if the project is approved will form conditions of the Nova Scotia Environment Operating Approval, to not exceed salinity levels beyond the natural variability of 25 metres from the outlet in the mixing channel. As a further precaution, the proponent will not be conducting brining operation during peak Striped bass spawning as a protection against the entrainment of eggs in the intake structures. This information and the additional mitigation measures have satisfied DFO's earlier concerns noted in the 2007 Science Review.

The 2007 Science document also noted:

*Given that advice has not been provided by DFO Maritimes Science on this type of project in the past, and given that this is*

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

*only a preliminary evaluation of the information contained within the Environmental Registration [emphasis added], it is recommended that a DFO-led scientific peer review meeting be conducted to more fully evaluate the scientific and technical information available for this project, to discuss additional mitigation and monitoring options, to determine what information may be required (if any) to address outstanding knowledge gaps.*

As with the earlier statement, this recommendation was made in light of the information gaps in the initial registration document. However, since 2007, significant research has been conducted at the site which has provided DFO with an understanding of the natural variability at the site relative to the proposed operation. Additional mitigation and monitoring has also been agreed to which further reduces the risks to fish that may be found near the project site.

Although not specifically noted in any internal documents, after seven years for additional data provided to DFO and new commitments by the proponent, the level of understanding of the local environment and the project details have evolved to the point where the concerns raised from the 2007 Science Review have been addressed.

Please let me know if there is any additional questions. Thank you.

Mark McLean  
Manager, Regulatory Reviews | Gestionnaire, examens réglementaires  
Fisheries Protection Program | Programme de protection des pêches  
Telephone | Téléphone 902-802-0740  
Facsimile | Télécopieur 902-426-1489  
Mark.McLean@dfo-mpo.gc.ca <mailto:Mark.McLean@dfo-mpo.gc.ca>  
Fisheries and Oceans Canada | Pêches et Océans Canada  
PO Box 1006, Dartmouth, NS B2Y 4A2  
CP 1006, Dartmouth, N-É B2Y 4A2  
Government of Canada | Gouvernement du Canada

Action:	Effective Date:
	Expiry Date - HADD/Serious Harm:
	Expiry Date - Other :
	Compensation/Offsetting:
	Included in List of Records:
Time Spent (Hrs):	Species at Risk:
	0.00
Authorization Rationale:	

 Fisheries & Oceans  
pêches et Océans

Warning: Information in PATH may be private and/or sensitive and should not be shared without appropriate consultation and/or permission. Refer to the Data and System Security section of the PATH Helpfiles for details



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

84

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

Action Date:

May 04, 2015

To

MacPhail, Helen

Document Date:

From:

McLean, Mark

Description:

**From:** McLean, Mark G

**Sent:** 2015-May-01 4:00 PM

**To:** MacPhail, Helen

**Cc:** Dera, Beata E <Beata.Dera@novascotia.ca> (Beata.Dera@novascotia.ca); MacNeil, Jack

**Subject:** RE: Alton meeting on Wednesday April 29, 2015

Helen:

The letter from Sipek' notes:

*Since the Shubenacadie River is home to migratory birds and fish, the Band states that there is a pressing requirement and legal obligation for the Federal government to also be part of any ongoing and meaningful consultations on this matter and the Band expects that the Honour of the Crown requires that both the Federal and Provincial Governments engage in meaningful consultations with the Band.*

As stated previously, DFO does not have a regulatory trigger for this project and therefor are not in a position to provide meaningful consultation (i.e., DFO has no regulatory authority and can therefore not compel the proponent to address the concerns of the Mi'kmaq). However DFO is will to continue to provide assistance and technical support to aid in the consultation process undertaken by Nova Scotia.

Please let me know if you have any questions. Thank you.

Mark McLean

Manager, Regulatory Reviews | Gestionnaire, examens réglementaires

Fisheries Protection Program | Programme de protection des pêches

Telephone | Téléphone 902-802-0740

Facsimile | Télécopieur 902-426-1489

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Mark.McLean@dfo-mpo.gc.ca <mailto:Mark.McLean@dfo-mpo.gc.ca>  
Fisheries and Oceans Canada | Pêches et Océans Canada  
PO Box 1006, Dartmouth, NS B2Y 4A2  
CP 1006, Dartmouth, N-E B2Y 4A2  
Government of Canada | Gouvernement du Canada

***If you have received this communication by mistake, please notify the sender immediately and delete the communication without printing, copying or forwarding it. Thank you.***  
***Si vous avez reçu cette communication par erreur, veuillez en aviser l'expéditeur immédiatement et la supprimer sans l'imprimer, la copier, ou la faire suivre. Merci.***

**From:** MacPhail, Helen [<mailto:Helen.MacPhail@novascotia.ca>]  
**Sent:** April 24, 2015 12:17 PM

**To:** Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Weseloh McKeane, Sean; Dera, Beata E; Skinner, Bradley; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; Jacobi, Carol; McLean, Mark G; Bird, Michael W; Fairbairn, Heather J; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S  
**Subject:** Alton meeting on Wednesday April 29, 2015

Hello All,

Just to let you know that we will be having a meeting on Wednesday, April 29 from 1.00 pm till 3.00 pm in 18C Barrington Tower.

I have attached two letters that I received from Sipek' requesting information on the project. I have also attached a letter from Alton to our Minister requesting an extension to the commencement of work, and alteration of a condition re: timing of clearing and grubbing for the Gas Pipeline Project.

Attachments not saved on PATH drive.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

We can discuss further on Wednesday but in the meantime, if you have any questions, do not hesitate to contact me.

Regards,

*Helen MacPhail*

**Environmental Assessment Supervisor  
Environmental Assessment Branch**

Nova Scotia Environment  
1903 Barrington Street  
Suite 2085  
PO Box 442  
Halifax, NS B3J 2P8  
Tel 424-3960  
Fax: 424-6925

Action:

Information Provided

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:

0.00

Attachments not saved on PATH drive.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

85

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

Action Date:

May 12, 2015

To

MacNeil, Jack

Document Date:

From:

MacPhail, Helen

Description:

**From:** MacPhail, Helen [mailto:Helen.MacPhail@novascotia.ca]

**Sent:** 2015-May-11 1:36 PM

**To:** Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Weseloh McKeane, Sean; Dera, Beata E; Skinner, Bradley; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; Jacobi, Carol; McLean, Mark G; Bird, Michael W; Fairbairn, Heather J; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack

**Subject:** Notes from Alton meeting on Wednesday April29, 2015

Hello All,

Please find attached notes from the last meeting, feel free to let me know of any revisions that are needed.

I am thinking that we should have a meeting this Wednesday, May13, but will confirm tomorrow.

Regards,

Helen MacPhail

Environmental Assessment Supervisor

**Environmental Assessment Branch**

Nova Scotia Environment

1903 Barrington Street

Suite 2085

PO Box 442

Halifax, NS B3J 2P8

Tel 424-3960

Fax: 424-6925

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
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Receive Date: 2006/08/11

Action:

Information Received

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale:

Directory:

File Name:

Document Type (Upload):

Press Release\_Alton RFP Announcement\_30Apr15

Other

File Extension:

pdf  
418,979

Directory:

File Name:

Document Type (Upload):

April 29, 2015

Other

File Extension:

docx  
15,609



Kwilmu'kw Maw-klusuaqn Negotiation Office  
**Mi'kmaq Rights Initiative**  
Our Rights. Our Future.

## PRESS RELEASE

For Immediate Release

April 30, 2015

### **Contract Awarded for Third Party Review of Alton Gas Project**

The Assembly of Nova Scotia Mi'kmaq Chiefs member to the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNQ) has recently awarded Conestoga-Rovers & Associates the contract to conduct a Third Party Review of the Alton Natural Gas LP Brine Storage and Discharge Facility.

During this Review, Conestoga-Rovers & Associates will examine existing data and evaluate the scientific and technical information. The purpose of this Third Party Review is to inform the Mi'kmaq of Nova Scotia, in their consultation with the Province of Nova Scotia, about potential impacts and risks associated with the project on the Shubenacadie River, specifically on fish and fish habitat.

"We have concerns about the potential impacts to the environment and Mi'kmaq Treaty Rights and Title," said Chief Paul Prosper, Assembly Lead Chief on Energy. "It's important that the science is looked at and thoroughly examined by environmental experts to ensure that all aspects are being considered."

The Mi'kmaq of Nova Scotia continue to exercise traditional practices of hunting, fishing, and stewardship of the resources and environment in the area of the proposed Alton Gas project and it is important to the Assembly of Nova Scotia Mi'kmaq Chiefs and KMKNQ that any development will not change or impact that.

Conestoga-Rovers & Associates is a global leader in engineering, environmental and construction services and is well-equipped with the technical expertise to conduct this study and review.

*The Kwilmu'kw Maw-klusuaqn Negotiation Office/Mi'kmaq Rights Initiative works on behalf of the Assembly of Nova Scotia Mi'kmaq Chiefs in the negotiations and consultations between the Mi'kmaq of Nova Scotia, the Province of Nova Scotia and the Government of Canada. KMKNQ was developed by the Mi'kmaq, for the Mi'kmaq. The purpose of these negotiations and consultations is to implement our Aboriginal and Treaty Rights from the Treaties signed by our ancestors in the 1700's. For further information visit our website at [www.mikmaqrights.com](http://www.mikmaqrights.com).*

-30-

**For more information contact:**

Crystal Dorey  
Communications Officer  
Mi'kmaq Rights Initiative  
Phone: (902) 843-3880  
Cell: (902) 957-0549  
E-mail: [crystaldorey@mikmaqrights.com](mailto:crystaldorey@mikmaqrights.com)

## **Meeting Notes – Alton April 29, 2015**

Present: MT Grant, Jack MacNeil, Kevin Bekkers, Jay Brenton, Brad Skinner,

Heather Fairbairn, Lee Anne Crouse, Bill O'Halloran, Dave Mackinnon, Sami Hines, Heather Potter.

### **NSE, EA Branch- Helen MacPhail**

NSE still waiting for help from Bruce Langille with security for gas pipeline in Protected Water Area.

Preparing responses to Sipek' letters of April 21 and 23. Will be sending out to gov. group for input and review.

Alton sent request to Minister looking for an extension to the 2 yr. commencement of work.

*Action - Helen M. will contact Bruce Langille re: security for the gas pipeline.*

*Preparing responses to Sipek' and will be looking for input and will share drafts with gov. group.*

### **NSE Regional Office – Brad Langille**

Draft Industrial Approval for Operation of the Brine Storage Pond will be shared with gov. group shortly. Recognize that revisions may be needed in response to KMK's independent review.

*Action – Draft IA to be shared with gov. group.*

### **DFO – Jack MacNeil**

Sent email re: a request from KMK through Beata on the two items from the DFO Science response.

### **OAA – Beata Dera**

Confirmed that the KMK's independent review will be looking at the data provided and this review will take 90 days (end of July). Peter Oram, Conestoga Rovers has been retained (see press release attached).

*Action - Beata will ask KMK when we can expect their response.*

Might be good to have check-in with KMK, Province, Alton

*Action - Looking into having another consultation meeting.*

### **NSE, Protected Areas – Dave MacKinnon**

Confirmed that compensation would be required for Stewiacke Wilderness Area, but not for the Saint Andrew's River Wilderness Area.

### **DNR – Sam Hines**

Crown Land Lease template has been sent to Alton who have not yet submitted a formal application. Once the application is received an internal review is required and this could take several months. Additional monitoring of the river could be included in the Lease, if it is required.

Dept . of Agriculture said they might have some survey information that would be helpful for the Lease.

*Action: DNR to contact Alton to explain that the formal application needs to be submitted.*

DNR working on the easement template for the gas pipeline

#### **NS Agriculture**

Goal is to have river access agreement in place by June 15, 2015, pending consultation with Mi'kmaq.

Provide some background as to how the dyke was breached and where things go from here.

*Action: To provide bns to NS Energy re: Alton and damage to dyke.*

#### **NS Energy**

Discussed DOE's duty to consult in relation to UARB approval to operate pipeline and caverns.

*Action: Bill O'Halloran to provide specifics on UARB process to gov. group.*



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Activity: Correspondence - Do not go to Macro Access Screen  
To: MacNeil, Jack  
From: MacPhail, Helen  
Description: Action ID No.: 86  
Action Date: July 16, 2015  
Document Date:

**From:** Denis, Alex X [mailto:Alex.Denis@novascotia.ca]  
**Sent:** 2015-June-30 9:02 AM  
**To:** Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Weseloh McKeane, Sean; Dera, Beata E; Skinner, Bradley; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; Jacobi, Carol; McLean, Mark G; Bird, Michael W; Fairbairn, Heather J; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; MacPhail, Helen  
**Subject:** Finalized Alton responses to Sipekne'katik First Nation

Good morning all,

The response tables have been finalized and provided to Sipekne'katik. I have attached them for your records, and they are also saved on the Alton gov group shared drive. Thanks again for your assistance.

Warm regards,

Alex Denis  
Environmental Assessment Summer Student | Environmental Assessment Branch  
Nova Scotia Environment  
1903 Barrington Street, Suite 2085  
(902) 424-6968

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Action: Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Directory:

File Name:

Document Type (Upload):

Sipekne'katik Alton Natural Gas Storage Facility Issues  
Other

File Extension:  
File Size:  
pdf 478,946

Directory:

File Name:

Document Type (Upload):

Sipeknekatik Alton Natural Gas Pipeline Issues Table  
Other

File Extension:  
File Size:  
pdf 457,967

## Sipekne'katik Issues Table on Alton Gas Storage Facility

June 2015

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
1.	April 23, 2015 letter from Chief Rufus Copage	TC#1.1 In the event that there is a proposed project expansion, modification or relocation of any aspect of the project, it is requested that Sipekne'katik receive notice in writing.	NSE	NSE agrees to inform Sipekne'katik in writing should any changes in terms of expansion, modification or relocation be proposed for the project.	SF
2.	April 23, 2015 letter from Chief Rufus Copage	TC#1.2 Please provide any background information about the two year time limit on project approval so we may understand the late start of this project from the original approval date.	NSE	The project met the condition to commence within two years of the approval date due to two pieces of the project. Work began on access roads development in 2008. In addition, the RoW water pipeline was cleared in April 2008. With the water and industrial approvals that are currently in place, the proponent is allowed to construct roads, construct the brine storage pond and install the water pipeline. Additional approvals will be needed before the proponent can begin operating the brine storage pond or build the gas pipeline.	SF
3.	April 23, 2015 letter from Chief Rufus Copage	TC#1.3 In the event that the proponent wishes to transfer, sell, lease, assign or otherwise dispose of this approval and the Minister is notified, Sipekne'katik requests to be notified in writing.	NSE	It should be mentioned that a transfer previously occurred in December of 2013. During this transfer, all of the equity interests of Veresen Energy Infrastructure in both the limited partner and the general partner was acquired by AltaGas Natural Gas Storage Ltd. Following this change in control, Alton Natural Gas Storage LP remained the approval holder and continues to be	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
			responsible for compliance with the terms and conditions of the EA Approvals.  NSE agrees to inform Sipekne'katik in writing should the proposed project experience any changes to approval into the future.	
4. April 23, 2015 letter from Chief Rufus Copage	TC#1.4 The proponent must implement all mitigation and commitments within the registration document. Working with appropriate permits in place must be respected by proponents with monitoring and enforcement in place by the responsible government department. Trust is given to government, to monitor and enforce. Sipekne'katik is of the opinion that this has been broken.	OAA	NSE, with the participation of other relevant provincial regulators and DFO, is working closely with the proponent to ensure that all requirements outlined in the conditions of the environmental assessment approval are met. This includes obtaining all appropriate permits and authorizations.	SF
5. April 23, 2015 letter from Chief Rufus Copage	TC#2.1 DFO confirmed (October 17, 2014 meeting) that all conditions for 2.1 were met by the proponent, with exception of a toxicity report focusing on Striped Bass eggs, larvae and juveniles. Please provide a breakdown showing the report name and author for each 2.1a, b, c, d, and e.	DFO	The Alton Natural Gas Estuary Monitoring Plan was submitted to DFO for review and comment. Term and condition #2.1 states that the proponent must create each plan as part of the application for Part V Approval under the <i>Environment Act</i> . The proponent has submitted the Alton Natural Gas Estuary Monitoring Plan as part of this approval. The plan is currently under review and it will be finalized once operations begin and the rest of the data can be collected.	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
			<p>The specific reports will be created when plant operations begin. When operations begin, NSE will be able to provide specific name and authors for each 2.1a, b, c, d and e.</p> <p>Baseline monitoring programs associated with EA conditions 2.1a, c and d were undertaken from 2008 to 2013. The purpose of the plan titled Alton Natural Gas Estuary Monitoring Plan submitted to DFO on June 18, 2014, was to take the results from the baseline monitoring programs and make modifications to mitigation plans and/or operation plans to prevent unacceptable environmental effects to the satisfaction of DFO and NSE. These monitoring plans were also reviewed to ensure adequate baseline data was obtained in order to identify any potential impacts during the upcoming operational phase of the project.</p> <p>In order to meet the condition 2.1c, the proponent has collected baseline information data on Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae. These studies have mainly been conducted by Dr. Jim Duston at Dalhousie University. The proponent has submitted detailed monitoring data and reports, some of which has been the material for Masters theses of several students at Dalhousie University. For example, <i>Spatio-Temporal Distribution of Eggs and Age-0 Striped Bass (Morone saxatilis) in the Shubenacadie River Estuary</i> written by Gina M. MacInnis and <i>Temporal Distribution of Morone</i></p>	

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
			<p><i>Saxatilis</i> Eggs and Larvae and <i>Neomysis Americana</i> in the Shubenacadie Estuary, written by Craig M. Reesor. The monitoring material can be seen in articles such as <i>Temperature and Salinity Effects on Survival and Growth of Early Life Stage Shubenacadie River Striped Bass</i> produced by Cook, Duston and Bradford in 2010 for example.</p> <p>DFO and the proponent decided that in order to get the most accurate results from the toxicity study, it would need to be conducted after the brining starts. Conducting the study after brining begins will allow the researches to use the actual brine that will be released in the river as opposed to brine created in the lab from the salt cores and Shubenacadie river water. Once brining is underway the toxicology study will be completed in the months of May, June and July when striped bass eggs, larvae and juveniles are available. The results of the toxicity study, including possible additional mitigation measures and design revisions are to be implemented as per the Alton Natural Gas Estuary Monitoring Plan and will be provided to DFO for review once available.</p>	
6. April 23, 2015 letter from Chief Rufus Copage	TC#2.2 Please provide information as to the 30 meter vegetated buffer between all watercourses and wetlands (rather than the 50 meter vegetated buffer that was referenced within	NSE	It is the understanding of the NSE that the proponent is planning to avoid all wetlands. An inspection took place on June 3, 2015 to determine whether the 30 meter buffer has been maintained. Due to high rainfall at the project site, the inspector was unable to determine conclusively that the proponent was able to meet the	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	the EA report). Please confirm that the 30 meter buffer was followed.		buffer. The inspector is scheduling an inspection at a later date when the ground has dried.  A watercourse alteration approval was issued June 6, 2014 for crossings along the water pipeline.	
7. April 23, 2015 letter from Chief Rufus Copage	TC#3.1 The proponent must develop a procedure for issues and concerns raised by potentially affected First Nation and Aboriginal communities, particularly related to environmental effects. Please provide a copy of the procedures.	OAA	The proponent has developed a Mi'kmaq Communications Plan and submitted it to NSE and OAA. The NSE understands the Sipekne'katik received a copy of the Mi'kmaq Communication Plan on March 17, 2015.	SF
8. April 23, 2015 letter from Chief Rufus Copage	TC#3.2 Please provide a copy of the Archaeological Contingency Plan which addresses 3.2 a, b, c and d. Construction work has taken place without proper permits/agreements in place. The proponent was asked to cease un-permitted construction work which it did not. Damage was done to the dyke area and later all work was stopped. Although damage was repaired, there have been no repercussions to the Proponent. Trust is given to the responsible government department that monitoring and	CCH Agriculture	Please find a copy of the Archaeology Contingency Plan attached (provided in the construction EPP). The archaeological contingency plan was in place when the damage was done to a section of the dyke in August 2014. The issue was that the permitted archaeologist was not on site monitoring the work at the dyke when it took place. CCH sent a letter dated November 19 <sup>th</sup> 2014 to reemphasize the requirement to have a permitted archaeologist in place for ANY excavation work on the dyke.  A new dyke parallel to the existing dyke was completed prior to its damage. This new dyke lessens the impact of any failure as a result of the breach. The risk of dyke failure has lessened now that spring ice and snow melt has occurred. Consequently, there is no urgency to	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	enforcement is respected and carried out. During the time the un-permitted work occurred, there was not an Archaeological Contingency Plan in place.		complete repairs. A revised construction agreement is being prepared in anticipation of work at the site.  CCH also has an application from the archaeologist for 2015 monitoring work and has reviewed it but sign off will not occur until consultation discussions have reached a satisfactory point.	
9. April 23, 2015 letter from Chief Rufus Copage	TC#3.3 The proponent must cease work in the event artifacts or an archaeological site is unearthed. What process has been developed in the event cultural resources are unearthed? Sipekne'katik requests to be informed in writing if cultural resources are discovered.	CCH NSE	The process that has been developed in the event cultural resources are unearthed are detailed in the Archaeological Contingency Plan. Please find the plan attached to this email.  NSE and CCH agree to inform Sipekne'katik if cultural resources are found.	SF
10. April 23, 2015 letter from Chief Rufus Copage	TC#4.1 The proponent is required to submit a detailed Environmental Management Plan (EMP). Based on the results of the monitoring programs, the proponent must make necessary modifications to mitigation plans and/or operations to prevent continued unacceptable environmental effects to the satisfaction of NSEL. Sipekne'katik requests to receive copies of all requests of all monitoring programs.	NSE	A detailed Environmental Management Plan (EMP) was submitted on October 14, 2014. An EPP was also submitted on Oct 14, 2014. Please find a copy of the EPP attached to this email, which includes the Dust Management Plan, Waste Management Plan and Issues Resolution System.	SF



	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
		Please provide a copy of each: a) Environmental Protection Plan (EPP), b) Dust Management Plan, c) Waste Management Plan (WMP), and d) Issues Resolution System.			
11.	April 23, 2015 letter from Chief Rufus Copage	TC#4.2 In the event that the proponent is required to consult with Transport Canada, it is requested that Sipekne'katik be notified in writing.	NSE	The proponent has informed NSE that approval from Transport Canada is not required.	SF
12.	April 23, 2015 letter from Chief Rufus Copage	TC#4.3 Prior to commencement of site preparation and construction activities, the proponent is required to obtain required permits from NSDNR as per the Beaches Act and the Crown Lands Act. Please confirm that the necessary permits will be or have been obtained prior to any activities on Crown lands.	DNR	The Department of Natural Resources is currently reviewing the proponent's application for the Submerged Crown Land Lease. As per your reference to the <i>Beaches Act</i> , it should be noted that the Act does not apply in this instance. There is shoreline but no beach along this section of the river.	SF

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
13.	April 23, 2015 letter from Chief Rufus Copage	TC#5.1 In areas where pipeline route alterations are considered, supplemental rare plant surveys must be conducted along the new route. Has there been any supplemental rare plant surveys conducted?	DNR	The proponent submitted results of surveys undertaken in the spring of 2008 to DNR. These surveys indicated no significant conservation issues would exist in the site of the gas storage facility. The proponent has met this condition.	SF
14.	April 23, 2015 letter from Chief Rufus Copage	TC#5.2 What standard mitigative measures to minimize the environmental effects of the project on plant communities have been implemented?	NSE DNR	Adverse environmental effects on vegetation are predicted to be not significant and no substantive plant issues exist in the project site. The proponent has agreed to avoid and mitigate as effectively as possible. Mitigation can be undertaken through multiple methods, such as: creating a buffer, or using native plant species in re-vegetation efforts. Measures to reduce the risk of introducing invasive species will also be implemented, including inspecting and cleaning construction equipment prior to use and regularly inspecting equipment prior to, during and immediately following construction in areas found to support purple loosestrife ( <i>Lythrum salicaria</i> ) so the species is not spread throughout construction sites. The area has a lengthy history of disturbance.	SF

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
15.	April 23, 2015 letter from Chief Rufus Copage	TC#5.3 Has the undisturbed retrorse sedge habitat become part of the new RoW? If so, did the proponent cordon off the area to prevent the movement of project related equipment through the habitat?	DNR	The proponent conducted rare plant surveys (spring 2014) along the cleared RoW prior to grubbing. Retrorse Sedge ( <i>Carex retrorsa</i> ) was not found anywhere along the cleared RoW. However, Lesser Brown Sedge ( <i>Carex adusta</i> Boott) which is listed as S2,S3 (Sensitive) under the ACCDC ranks was found in one section (~7+800, near Alton road) of the RoW, and the appropriate buffer (5m) was flagged and maintained during construction.	SF
16.	April 23, 2015 letter from Chief Rufus Copage	TC#5.4 Was all project clearing and grubbing conducted outside of the bird breeding season?	NSE	The proponent asked for an amendment to this condition in 2008. The request for an amendment was approved to allow grubbing during the bird breeding season with the proviso that the Proponent must consult with the Canadian Wildlife Service and the NSDNR to develop a suitable monitoring and mitigation plan for breeding bird activities. The proponent was having difficulty complying with this condition due to balancing scheduling of work with the obtainment of a variety of permits and approvals.	SF
17.	April 23, 2015 letter from Chief Rufus Copage	TC#5.5 The proponent must not conduct project activities, during the period from April 1 to July 30, within 200 metres of the Osprey nest identified in the field surveys. Can NSE confirm that this condition was met?	DNR	DNR confirms that this condition has been met. A detailed survey completed by Terrain group has determined that the nest is located at a distance of 173 meters from the edge of the 20 meter easement. In 2008, DNR had approved clearing of the easement through this area (resulting in work within the 200 meter buffer) but certainly no closer (i.e. no temporary work area can be cleared within the 200 meter mark).	SF
18.	April 23, 2015 letter from	TC#5.6 Please provide a copy of the field study for the Great Blue Heron	DNR	Please find a copy of the field study attached, titled Great Blue Heron Rookery Survey. This study has been shared with CWS.	SF

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	Chief Rufus Copage	colony. Please confirm that this study has been shared with the Canadian Wildlife Service (CWS). Have all project activities been conducted with a 400 meter buffer zone from the rookeries from April through mid-August? Have all disturbance activities been conducted with a one kilometer buffer zone? Have all tree removal activities been conducted with a 400 meter buffer zone?		<p>In the field survey report it was confirmed that all project activities have been conducted with a 400 meter buffer zone from the rookery from April through mid-August. It was also confirmed that no project activities deemed to have a high disturbance factor (ie. blasting) are expected to occur within a one-kilometer radius of the rookery. In addition, forest harvesting related activities will take place outside of the 400 meter buffer zone.</p> <p>The proponent has provided information on what may have disturbed the Great Blue Heron rookery – DNR attributes it to cumulative effects in the area.</p>	
19.	April 23, 2015 letter from Chief Rufus Copage	<p>TC#6.1 Has the proponent provided the following for review and approval: a) a groundwater monitoring plan and b) a well survey plan? Sipekne'katik requests to receive copies of all results of these monitoring programs.</p> <p>TC#7.1 Please provide a copy of the a) Spill Management Plan, b) an Emergency Response and Contingency Plan, c) Details of the Environmental, Health and Safety (EHS) system, and d) Details for the assessment of other water uses or withdrawals in or near</p>	NSE	<p>The proponent has provided both a groundwater monitoring plan and a well survey, both approved by a NSE hydrogeologist on November 24, 2014 and September 29, 2014, respectively. Please find the groundwater monitoring plan and well survey results included in the response package.</p>	SF
20.	April 23, 2015 letter from Chief Rufus Copage	<p>TC#7.1 Please provide a copy of the a) Spill Management Plan, b) an Emergency Response and Contingency Plan, c) Details of the Environmental, Health and Safety (EHS) system, and d) Details for the assessment of other water uses or withdrawals in or near</p>	NSE	An Emergency Response and Contingency Plan (dated May 7, 2015) and a letter dated May 7 <sup>th</sup> , 2015 was submitted to NSE on May 11, 2015. The information was reviewed and was determined to be incomplete. An email was sent to the proponent requesting the missing information. Additional information was submitted on May 21, 2015 and has been determined to be complete.	SF

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
		the project that could be affected by project related accidents.		Please find a copy of the Emergency response and Contingency Plan attached.	
20.	April 23, 2015 letter from Chief Rufus Copage	TC#7.2 Sipekne'katik requests to receive copies of all monitoring programs over the lifetime of the project, at the same schedule established and revised by NSEL.	NSE	NSE agrees to send Sipekne'katik copies of all monitoring programs.	SF
21.	April 23, 2015 letter from Chief Rufus Copage	Within the brine that is proposed to be released into the Shubenacadie River System, it would consist of salt, sediment, naturally occurring minerals and potentially other chemicals used during the drilling process. a. How will the temperature of this brine release impact the river system? b. How will the brine release impact the bank of the river? c. Will a residue form along the river banks? d. How far both upstream and downstream will the residue extend? e. What impact will the residue have on fish and fish	NSE DFO	a) It is anticipated that there will be very little temperature difference between the mixing channel water and the outfall, as there is minimal heat exchange during the brining process and the water will be close to ambient temperatures after leaving the mixing pond. The Heat Transfer Study located in Appendix H of the EA document illustrates the worst case scenario, which is water temperature raising by 0.6 degrees. However, the water will then sit in the brine pond and be discharged over a six meter width in the mixing channel into continuous flow of river water, thus it is designed so the ambient river temperature will be reached within the mixing channel.  To provide further detail, any potential temperature difference would be undetectable at a few meters from the outfall pipe due to the ratio of brine water to tidal flow in the discharge area. The ebb flow volume is estimated to be 4,042,000 cubic meters of water and the discharge would be 4,500 cubic meters of brine per tidal	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	habitat and their food and to the overall ecosystem?		<p>cycle. This results in a ratio 898 parts tidal water to every 1 part discharge water. At this ratio, there should be no measurable change in water temperature.</p> <p>b) The mixing channel design will have twin perforated lines across the bottom of the channel to eliminate direct discharge and uniformly distribute the brine across the base width of the mixing channel. This design, together with the high dilution ratio, (see above) should result in no impacts to the banks for the river as a result of the brine release.</p> <p>c) As noted in the response to a) above, the ratio of tidal water to brine will result in a high degree of dilution of brine water. The proponent is required to ensure salinity levels do not exceed naturally occurring salinity levels (28 part per thousand) at 5 meters from the outfall and no greater than 7 parts per thousand above background levels to a maximum of 28 parts per thousand. Essentially, the water from the mixing channel will be at background salinity levels once it enters the river and will not create any type of residue on the river banks.</p> <p>d) There will be no residue from the brine entering the river as it is just river water with additional dissolved salt.</p> <p>e) Appendix C- Section 3.2 of the above report describes the effect of eggs, larvae and migratory fish as either no significant or insignificant. Table 1 in this section lists</p>	

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
				various species' life stages with outfall risk. Outfall risk are listed as low, none, moderate for striped bass, winter flounder and smooth flounder, and minimal for American eel. As in d) above the brine will contain only water from the river and additional salt. The salinity will be at background levels once it enters the river from the mixing channel. The proponent has created a plan that has been accepted by DFO to protect the fishery resource in the river.	
22.	April 23, 2015 letter from Chief Rufus Copage	What is the overall impact to the overall ecosystem this project as whole may have, taking into account the brine holding pond, brine release to river, all pipeline construction and potentially 18 underground natural gas storage caverns?	NSE	<p>It remains NSE's prediction that significant environmental impacts are not likely according to the environment assessment conducted, design mitigation, proposed follow-up and adaptive management. NSE is confident that any adverse effects or significant environmental effects of the undertaking can be adequately mitigated through compliance with the terms and conditions.</p> <p>Significance of environmental impact includes factors such as magnitude, geographic extent, frequency, duration, geographical extent and reversibility. The environmental assessment process took into account residual environmental effects, meaning those effects and impacts that remain after economically and technically feasible mitigation (design and site specific) measures have been incorporated. Mitigative measures and project design can be modified as projects progress, through a process called adaptive management, meaning the proponent has included many operational design features into the project which can be adjusted if issues</p>	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
			<p>arise. For example, pumps can be shut off in response to any upset conditions or other malfunctions in caverns. Adaptive management is apparent throughout the contingency plans the Minister has requested from the proponent as part of the Terms and Conditions of approval.</p> <p>For this project, the proponent applied significance criteria to each Valued Ecosystem component (VEC): Sections 6.1.3, 6.2.3, 6.3.3, 6.4.3, 6.5.3, and 6.6.3 of the EA Registration.</p> <p>It is also important to note that the project has been approved for a total of 10 to 15 storage caverns, not a potential of 18 as suggested in the comment. And a total of three will be formed initially.</p>	
23. April 23, 2015 letter from Chief Rufus Copage	The MEKS study concludes the project area has both current and historic use. What weight is given to a MEKS? Loss of traditional fishing, hunting, and gathering and use sites is a concern.	OAA	<p>MEKS are an important tool within the EA process, which help to determine and analyze potential impacts of a project on Mi'kmaq land and resource use.</p> <p>The MEKS identified Mi'kmaq Traditional sites and areas, including hunting, fishing and harvesting in the Project area. The MEKS recommended that both the proponent and the Province meet with Mi'kmaq leadership and discuss the project within the context of Mi'kmaq traditional areas. Continued Crown consultation aims to fulfill this recommendation. The proponent has also committed to active engagement of Sipekne'katik First Nation and ongoing discussions.</p>	SF



Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
24. April 23, 2015 letter from Chief Rufus Copage	What is the potential impact/toxicity to microorganisms/food for fish species within the Shubenacadie River System?	DFO	<p>DFO has predicted that there will be no impacts to microorganisms/food for fish as a result of the project. Many studies were undertaken to come to this conclusion. For instance, chemical analysis of a diluted (10:1) brine made using a salt core were shown to have detectable levels of elements for copper (0.3 µg/L), iron (17 µg/L), lead (0.2 µg/L), manganese 2 µg/L) and strontium (180 µg/L). The Canadian Environmental Quality Guidelines for the Protection of Aquatic Life for copper is 2 µg/L, for iron is 300 µg/L and for lead is 1 µg/L. There is no data under the <i>Canadian Environmental Quality Guidelines for the Protection of Aquatic Life</i> for manganese, however, exposure to manganese at low levels is nutritionally essential in humans and animals. The recommended daily intake of manganese is 2 to 5 mg/d for adults and adolescents. Strontium is found naturally as a non-radioactive element.</p> <p>In a 2012 <i>Supporting Info Aquatic Resources Report</i> (<a href="https://www.ceaa-acee.gc.ca/050/documents_staticpost/59540/56367/A36-Supporting_Info_Aquatic_Resources.pdf">https://www.ceaa-acee.gc.ca/050/documents_staticpost/59540/56367/A36-Supporting_Info_Aquatic_Resources.pdf</a>), it is reported Biesinger and Christensen (1972) conducted 21-day tests with the water flea, <i>Daphnia magna</i>, to determine effects of strontium exposure on survival and reproduction. They reported a 21-day LC50 of 86,000 µg/L for survival and a 21-day EC50 of 60,000 µg/L for reproduction. In addition, an EC16 of 42,000 µg/L was calculated for reproduction, to represent the lowest effect size that could be</p>	SF

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
				distinguished from variability associated with the control response. This level is well above the 180 µg/L reported. Given the levels are well within the guidelines or studied levels and the high dilution rate noted previously, it is predicted that there will be no impacts to microorganisms/food for fish as a result of the project.	
25.	April 23, 2015 letter from Chief Rufus Copage	DNR's claim that sturgeon only reproduce in the St. John River has not yet been confirmed by Aboriginal Traditional Knowledge (ATK).	DFO	If sturgeon are found to be present, they would be exposed to the same changes in environment as those for other species reviewed by DFO. It is predicted that change in factors such as salinity, temperature and sediment will be within the natural variable experience at the project site at that time of year, therefore it is anticipated that these changes will not have any impact on any of the species present.	SF
26.	April 23, 2015 letter from Chief Rufus Copage	Regarding Striped Bass, Alton studies have found that variation in temperature, rainfall and wind all influence recruitment and survival. What is the impact from the water intake and brine release? Will reproduction be impacted by raised/different salinity levels?	DFO	Protection of fish and fish habitat, in this case specifically the striped bass, Atlantic salmon and Atlantic sturgeon, were key considerations in the Environmental Assessment process. In addition to on-going monitoring, the proponent has committed to specific measures to ensure striped bass populations are protected. Specifically the company has committed to stop brining activities (withdrawal and release of water) during the peak Striped bass spawning period. The NSE is currently reviewing the proponent's Industrial Approval Application. Should an NSE Industrial Approval be granted a restriction on brining during Striped bass spawning and a fish monitoring plan will likely be two of the conditions.	SF
27.	April 23, 2015 letter from	There is concern for other species that are found within the	DFO	The main focus of monitoring of the project will be to ensure that environment conditions at the site, primarily	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
Chief Rufus Copage	Shubenacadie River System besides striped bass. Atlantic salmon, American eel, Atlantic sturgeon and other fish species are important also. How are these species being considered and/or monitored in this project?		salinity, water temperature and sediment levels are within the natural variability encountered at that time of the year. If conditions are within these natural ranges it is anticipated that none of the species found near the site would be affected by operations. Monitoring for all species will be done at the intake location to monitor the potential of entrainment of fish in the intake pipe. There will be specific monitoring of Atlantic salmon (SARA listed) and for Stripped bass given the significance of the spawning area and at the sensitivity of the eggs and large stages for this species.	
28. April 23, 2015 letter from Chief Rufus Copage	Baseline data and on-going monitoring of all species within the river system is needed. Data that is collected needs to be made available. Who will oversee the collection of this data? Who will the Proponent report to and how often?	OAA NSE DFO	<p>NSE oversees the collection of baseline and on-going monitoring data. The reporting requirements will be part of the Industrial Approval, which is currently being drafted. Upon finalization, it can be shared with Sipekne'katik.</p> <p>The proponent has made the following commitments to monitor intake and discharge. Examples of monitoring commitments include:</p> <ul style="list-style-type: none"> <li>• Fish impingement</li> <li>• Water velocities at intake</li> <li>• Salinity will be measured in the Estuary at the site of water withdrawal and discharge</li> <li>• Egg and larvae sampling for presence and to determine whether salinity is negatively impacting species in the Estuary</li> <li>• Assessing the toxicity of brine on representative organisms prior to discharge of diluted brine</li> </ul>	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
			<ul style="list-style-type: none"> <li>Monitoring of discharge salinity will occur continuously</li> <li>Fish behavior monitoring in the mixing channel to ensure they do not encounter high salinities that affect their survival</li> </ul> <p>It is also important to note that the proponent will monitor the salinity levels in diluted brine discharged to the Estuary during the brining stage of the Project and results will be made available to regulators for review. Discharge will be monitored on a continual basis to ensure that salinity of the diluted brine does not exceed 25 ppt., which below the normal salinity level of 28 ppt (see #21 response above).</p> <p>The monitoring data and information will be made available on a regular basis to Sipekne'katik First Nation by NSE.</p>	
29. April 23, 2015 letter from Chief Rufus Copage	What other minerals and/or chemicals may be present within the salt formation?	NSE DFO	<p>A brine made from distilled water and salt from the cavern formation was tested for a number of parameters and compared to river water tested for the same parameters. Only Strontium was detected in low levels in the brine from the salt formation. Strontium levels in the river water are 5.8 times higher than the brine solution. Many elements were detected in the Shubenacadie River water while only Strontium was detected in the brine solution. Please see the attached table titled Brine vs. Shubenacadie River Water element levels to see the results of this test in full.</p>	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
			Please note that NSE may require the proponent to test for other contaminants in the brine water prior to it being released into the Shubenacadie River.	
30.	April 23, 2015 letter from Chief Rufus Copage  What is the impact of fine sediment and its influence on the hydro dynamics of the river? Does this fine sediment have potential to impact marine fish species and plants?	NSE	Water is withdrawn from the river and goes into a large settling pond, where solids will settle from the river water. Finer suspended solids that do not settle out in the pond will be filtered as the water leaves the pond to be pumped to the cavern site. The water will dissolve salt in the caverns and any sediment in the salt will either settle to the bottom of the cavern or settle out in the brine storage pond before the brine is released into the mixing channel. There will be less sediment in the brine returning to the river than in the water that is withdrawn.  The proponent suggests that where possible, measures to minimize and control erosion and sedimentation will be built into the Project specific Environmental Protection Plan (EPP).	SF
31.	April 23, 2015 letter from Chief Rufus Copage  During construction, can water from a construction site be pumped directly back into the river?	NSE	Construction water is pumped back into the river, but it has time to settle as it's discharged on dykes or vegetated rivers before reaching the Shubenacadie. The projects Erosion and Sediment control plan suggests that water should be pumped into perforated piping or hoses that are placed within the vegetated slope or bench of the dyke, to encourage laminar flow of water towards the river. The plan also suggests that alternatively, water may be discharged to ditches leading to the Aboiteau (the sluice in a dyke), if check dams are in place and effluent	SF

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
				does not excessively impact sediment loading in the river. The proponent suggests that based on the naturally elevated sediment load in the river, the above protocol is considered to be a reasonable de-watering approach during construction.	
32.	April 23, 2015 letter from Chief Rufus Copage	What is the potential cumulated effect of this project in relation to other projects that exist in the Bay of Fundy?	NSE	With the contingency plans and adaptive management strategies the proponent has in place, NSE is confident that potential cumulative effects will be accounted for and mitigated. It is also important to note that should future projects be proposed in the project area, they will likely need to undergo environmental assessment, which NSE would either lead or co-lead (if it requires a joint review with federal government). Due to this, NSE would consider cumulative effects in the project area (including Alton's project), and ensure that environmental impacts will be avoided or minimal.	SF
33.	April 23, 2015 letter from Chief Rufus Copage	If there are 3D models for brine discharge scenarios or emergency scenarios, please provide a copy.	NSE	Matrix Solutions Inc. provided some modeling in the supplemental report, Appendix B of the EA, but no 3D models were created.	SF
34.	April 23, 2015 letter from Chief Rufus Copage	The project falls within the area where 12% protected lands were identified. The EA speaks to the fact that these lands were set aside as a candidate in 2011. The two candidate 12% protected land patches were chosen due to their distinct features. Although this project originally began in 2007 as a	PAB	Please see attached map titled 'Alton Gas Storage Lease and Pipeline Route including Stewiacke River and St Andrews River Wilderness Areas' to help visualize the area. As a result of a purchase of lands by the Province from Northern Pulp in 2010, nearly 3900 hectares of former Northern Pulp land in the St. Andrews River area became provincial Crown land. This land was included among the areas put forward for public review in 2011 as lands being considered for protection. Subsequently, a	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	storage facility, it would be assumed that at some point in the future a pipeline would need to be constructed to bring the hydrocarbons to the storage facility. The loss of Crown lands is a loss of access to that land area.		portion of this area was proposed not to be protected in favour of a nearby area currently privately owned (Our Parks and Protected Areas – A Plan for Nova Scotia, Province of Nova Scotia, 2013). Protection of this substitute area depends on provincial acquisition of the land, possibly through a trade. Whether this occurs or not, and whether all or only a portion of the area currently planned for protection is ultimately protected, there will have been a net increase of 3900 ha of Crown land in this area since 2009. The planned protected area would be a provincial wilderness area, which places restrictions on certain types of uses and motorized access but which still allows for traditional patterns of hunting, fishing, and trapping. Consultation with Sipekne'katik will be initiated in the upcoming months regarding St. Andrews River area.	
35. April 23, 2015 letter from Chief Rufus Copage	The close proximity to a residential area of the underground storage caverns is concerning.	NSE	NSE acknowledges the concern of Sipekne'katik with the close proximity of the storage caverns to a residential area. However, the proponent chose this location due to a variety of technical/economically/environmental reasons after considering several sites.	SF
36. April 23, 2015 letter from Chief Rufus Copage	Given the recent developments in case law in Canada (Tsilhqot'in, Rio Tinto) regarding Aboriginal Rights and Title and the strict requirement that the Crown must proceed carefully when it has knowledge of a potential aboriginal claim or right to an area where there may be an	NSE OAA	NSE initiated TOR consultation on the Alton Natural Gas Storage Facility in 2007 and on the Alton Natural Gas Pipeline in 2012. Consultation has continued since that time, although the storage facility project construction was not continuous over the past 7 years and has been re-initiated by the proponent over the past year. The Province is committed to continuing meaningful	SF

Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	adverse impact of existing or asserted rights and title. The Band reaffirms that the Mi'kmaq have never sold, ceded, signed away or traded any rights and title and as such asserts that aboriginal rights and title, as well as Treaty rights are very much in existence for the area where the activity is contemplated.		consultation with the Mi'kmaq on both components of this project.	
37. April 23, 2015 letter from Chief Rufus Copage	Since the Shubenacadie River is home to migratory birds and fish, the Band states that there is a pressing requirement and legal obligation for the Federal government to also be a part of any ongoing and meaningful consultations on this matter and the Band expects the Honour of the Crown requires that both the federal and provincial levels of Government engage in meaningful consultation with the Band.	NSE OAA	<p>As stated in the above response, NSE is committed to meaningful and ongoing consultations with Sipekne'katik First Nation. We are hopeful that our actions and conversations with the Band reflect this understanding and commitment to protecting not only the Shubenacadie River, but all of Nova Scotia's environment, as this our mandate.</p> <p>The consultation process reflects a genuine effort to address Sipekne'katik's issues and concerns related to impacts on Treaty and Aboriginal rights. In instances where we are not able to address the concerns, the government must balance information exchanged during the consultation process with other information in order to reach a decision. Accordingly, with the aim of continuing meaningful consultation with Sipekne'katik First Nation, regarding the Alton Natural Gas Project, the Province has not issued the following authorizations:</p> <ol style="list-style-type: none"> <li>1. Department of Natural Resources Lease for submerged Crown land along Shubenacadie River.</li> </ol>	SF



	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
				<p>2. Department of Agriculture Construction Agreement to construct dyke on Crown land.</p> <p>3. Nova Scotia Environment Industrial Approval to operate brine pond.</p> <p>DFO does not have a regulatory trigger for this project and therefore have not initiated consultation with the Mi'kmaq of Nova Scotia (i.e., DFO has no regulatory authority and can therefore not compel the proponent to address the concerns of the Mi'kmaq). DFO will continue to provide assistance and technical support to aid in the consultation process undertaken by Nova Scotia.</p>	

**Sipekne'katik Issues Table on Alton Gas Pipeline**

**June 2015**

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
1.	April 21, 2015 letter from Chief Rufus Copage	TC#1.2 Expansion, modification or relocation of any aspect of the undertaking must be submitted to the Environmental Assessment Branch for review. Sipekne'katik requests to be notified in writing if any aspect of the undertaking is proposed to change.	NSE	A minor re-alignment was required for the pipeline due to safety concerns raised by a landowner (please see attached map titled Pipeline Re-Alignment Option). The new route minimizes impacts to the environment by avoiding wetlands and watercourses, where possible. Following a review of the Alton Natural Gas Pipeline Project Proposed Re-Alignment (January 7, 2015), it has been determined that no further environmental assessment (EA) is required, with the condition that an archaeological impact assessment, as well as physical assessments for wetlands and watercourses are completed for the new alignment.  The Sipekne'katik will be notified in writing if any aspect of the undertaking is proposed to change.	P
2.	April 21, 2015 letter from Chief Rufus Copage	TC#1.3 It is noted that work began for this project within two years of the date approval was granted.	NSE	Work has not yet begun on the pipeline. On April 23, 2015, the proponent requested an extension for the time limit for commencement of work as set forth in Condition 1.3 of the EA approval to allow more time for consultation with the Mi'kmaq. The Minister agreed to this two year extension, and the date of commencement has been extended until May 21, 2017.	P
3.	April 21, 2015 letter from	TC#1.4 The approval holder must not transfer, sell, lease, assign or	NSE	A transfer has previously occurred in December 2013. During this transfer, all of the equity interests of Veresen Energy Infrastructure in both the limited partner and the	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	Chief Rufus Copage	otherwise dispose of this approval without written consent of the Minister. In the event any of these events occur, Sipekne'katik requests to be notified in writing before the Minister makes a decision.		<p>general partner was acquired by AltaGas Natural Gas Storage Ltd. Following this change in control, Alton Natural Gas Storage LP remained the approval holder and continues to be responsible for compliance with the terms and conditions of the EA Approvals.</p> <p>NSE agrees to notify Sipekne'katik in writing before the Minister makes a decision on transferring, selling, leasing, assigning or otherwise disposing of the approval.</p>	
4.	April 21, 2015 letter from Chief Rufus Copage	TC#1.5 It is expected that the approval holder implement all mitigation and commitments within the registration document and focus report. In the event that Nova Scotia Environment (NSE) approves changes to any mitigation and or commitment, Sipekne'katik requests to be notified in writing prior to approval being granted.	NSE	NSE agrees to notify Sipekne'katik in writing before approval to change mitigation and commitments within the registration document and focus report.	P
5.	April 21, 2015 letter from Chief Rufus Copage	TC#1.6 Sipekne'katik requests to receive a copy of the report to be given to NSE's Environmental Assessment Branch one year following construction of the undertaking.	NSE	NSE agrees to provide Sipekne'katik the report one year following construction of the undertaking.	P
6.	April 21, 2015 letter from	TC#2.1 Approval is based on the "Original Alignment" of the pipeline as	NSE PAB	Since the Minister's August 2012 decision requiring the Focus Report, the situation regarding the 12% protected lands has changed. NSE proposed that the St. Andrew's	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	Chief Rufus Copage	described in the EA registration document and focus report. Please explain why the 12% set aside lands were not avoided and the alternate not chosen.		<p>River Wilderness Area (part of the 12% set aside lands) be moved to the east (see attached map titled Alton Gas Storage Lease and Pipeline Route including Stewiacke River and St Andrews River Wilderness Areas to help visualize the area). This would mean that the pipeline no longer passes through these 12 % lands. This designation does, however, require further consultation, planning and the acquisition of private land. Should efforts not succeed to acquire private lands, consideration may be given to protecting an area similar to the original St. Andrew's River Wilderness Area. NSE will be initiating consultation with Sipekne'katik on St. Andrews River Wilderness area in the coming months.</p> <p>In addition, the "Original Alignment" still overlaps the Stewiacke River Wilderness Area. For this reason the company must develop and implement a compensation plan to be approved by NSE. To date, only very preliminary discussions between the proponent and NSE has taken place. This plan shall include, but may not be limited to, the securement of conservation land in the vicinity of the project for statutory protection.</p> <p>The environmental assessment review of the "Alternative Alignment" found that this corridor would result in a significant increase in the number of wetlands and watercourse crossings over the "Original Alignment". In addition, it had a greater potential to have more plant and animal species of concern present based on the number of</p>	

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
				vegetation types, wetlands and riparian habitat present in this corridor.	
7.	April 21, 2015 letter from Chief Rufus Copage	TC#3.1 Prior to clearing and construction, the approval holder must submit the Emergency Management Plan (EMP) to NSE for review by the Department of Fisheries and Oceans (DFO) and review and approval by NSE. Please provide Sipekne'katik with a copy of the approved EMP by NSE. Please provide the date the EMP was reviewed by DFO and the date the EMP was reviewed and approved by NSE.	NSE	NSE has not yet received the approved EMP but can inform Sipekne'katik of the EMP review date when it occurs.	P
8.	April 21, 2015 letter from Chief Rufus Copage	TC#3.2 The approval holder must update and revise the EMP at the request of NSE at any time during construction or operation of the undertaking. Sipekne'katik requests to be notified in writing in the event NSE requests the EMP be updated or revised.	NSE	NSE will notify Sipekne'katik in writing in the event it requests the EMP be updated or revised.	P
9.	April 21, 2015 letter from Chief Rufus Copage	TC#3.3 Sipekne'katik requests to receive a copy of any revision to the EMP approved by NSE.	NSE	NSE agrees to provide Sipekne'katik a copy to a revised EMP should it be required to be revised.	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
10.	April 21, 2015 letter from Chief Rufus Copage	TC#3.4 Sipekne'katik requests a copy of the post construction monitoring and reporting schedule created in consultation with NSE and DFO included as part of the EMP.	NSE	NSE agrees to provide a copy of the post construction monitoring and reporting schedule to Sipekne'katik as part of the EMP.	P
11.	April 21, 2015 letter from Chief Rufus Copage	TC#3.5 Sipekne'katik requests copies of all revisions to the EMP distributed to NSE and other regulatory agencies.	NSE	NSE agrees to provide Sipekne'katik with copies to all revisions of the EMP that may be distributed.	P
12.	April 21, 2015 letter from Chief Rufus Copage	TC#4.1 Within four years of the date of this approval (May 21, 2017), the approval holder must develop and implement a compensation plan that has been reviewed and approved by NSE, for impacts on the Stewiacke River Wilderness Area. This plan shall include, but may not be limited to, the securement of conservation land in the vicinity of the undertaking for statutory protection by the province. Sipekne'katik requests to have a full participatory role in this plan.	PAB	The "Original Alignment" of the pipeline overlaps with the Stewiacke River Wilderness Area which is why the proponent must develop a compensation plan that has been approved by NSE.  NSE agrees to involve Sipekne'katik in the development of a compensation plan for the impacts to the Stewiacke River Wilderness Area. To date, there have been only very preliminary discussions between the proponent and NSE regarding the compensation plan.	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
13.	April 21, 2015 letter from Chief Rufus Copage	TC#4.2 Prior to any clearing or construction in a proposed wilderness area the approval holder must provide notification to NSE. Please provide dates the approval holder notified NSE prior to clearing and or construction occurring within the wilderness area.	NSE	No clearing or construction in a proposed wilderness area has commenced as of yet. But NSE is ensuring that the approval holder provide notification prior to clearing or construction. The notification information once provided by the proponent will be shared by NSE with Sipekne'katik.	P
14.	April 21, 2015 letter from Chief Rufus Copage	TC#4.3 The approval holder must ensure that any work within a designated wilderness area is approved by the Minister of Environment as required by the Wilderness Protection Act. Please confirm that all work conducted within the wilderness area by the approval holder has been conducted as part of this term and condition.	NSE	No work within a designated wilderness area has commenced as of yet. If any work proceeds, NSE will ensure it meets all EA conditions.	P
15.	April 21, 2015 letter from Chief Rufus Copage	TC#5.1 Has the approval holder undertaken any "wet" watercourse crossings?	NSE	The approval holder has not undertaken any wet watercourse crossings.	P
16.	April 21, 2015 letter from Chief Rufus Copage	TC#5.2 The approval holder must obtain an approval from NSE for the construction of watercourse crossings. Please provide dates that	NSE	Five watercourses will need to be crossed for the pipeline. It is proposed that conventional boring or horizontal directional drilling (HDD) will be utilized for the Stewiacke River. The Stewiacke River proposed HDD crossing will be further described within the project-specific EMP. It is	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
		NSE provided approval for the construction of watercourse crossings.		proposed that the remaining watercourses will be crossed utilizing a dry crossing technique.  The approval holder has not applied to NSE for watercourse crossings as of yet and thus NSE has not yet issued approvals for this work. When this takes place, NSE will notify Sipekne'katik.	
17.	April 21, 2015 letter from Chief Rufus Copage	TC#5.3 Any environmental impacts on the public water supply for the Town of Stewiacke must be corrected by the approval holder to the satisfaction of NSE. The undertaking is located within a water protected area (since 1983). Indian Brook's water source is from the same aquifer that of the Town of Stewiacke, what is the risk to our water source?	NSE	The Stewiacke water supply is a surface water supply and draws its water from St Andrews River. It does not share a source water area with the Indian Brook supply. The Indian Brook Supply is supplied by ground water and has two pumping wells. A recent ground water under direct influence report (March 2015) was prepared by CBCL for the Sipekne'katik Band, Indian Brook Operations and Maintenance Department. The report indicates the groundwater flow is expected to originate up gradient west and south west of the Indian Brook well field and the channel aquifer features suggest the directional flow is from the west to east. The undertaking is located approximately 20 kilometers to the east of the Indian Brook aquifer. This distance and direction from the Indian Brook aquifer suggest there would be no influence or effect from the undertaking to the Indian brook water supply.	P
18.	April 21, 2015 letter from Chief Rufus Copage	TC#5.4 In the event that the drinking water supply of Indian Brook is impacted from this undertaking, will an alternate temporary and/or	NSE	Condition #5.4 refers to the Stewiacke water supply, of which the pipeline could potentially impact. The condition does not cover the Indian Brook water supply, however, since the undertaking is located approximately 20 kilometers to the east of the Indian Brook aquifer, it is	P



	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
		permanent drinking water supply be provided to the community of Indian Brook?		unlikely that the water supply of Indian Brook will be impacted as a result of the Alton pipeline.	
19.	April 21, 2015 letter from Chief Rufus Copage	TC#6.1 Prior to any blasting, did the approval holder conduct a pre-blast survey for water wells within 800 meters of the point of blast? Was the survey conducted in accordance with the NSE "Procedure for Conducting a Pre-Blast Survey"? Have water well impacts from blasting been corrected by the approval holder to the satisfaction of NSE?	NSE	The pre-blast survey has not yet been received by NSE. Once it has been received, NSE can provide an update to Sipekne'katik.	P
20.	April 21, 2015 letter from Chief Rufus Copage	TC#7.1 Prior to clearing and or construction, did the approval holder provide DNR's Regional Services and Wildlife Division staff with digital way point files revealing precise locations for all "RED", "YELLOW" and "UNDETERMINED" listed species based on actual field inventories for rare/endangered vascular, non-vascular plants, lichen, birds, mammals, and reptiles within the affected corridor? Please provide the date.	DNR	DNR's Regional Services and Wildlife Division staff have not yet received the digital way point files revealing precise locations for rare/endangered vascular, non-vascular plants, lichen, birds, mammals, and reptiles within the affected corridor. Once this information has been received, NSE can provide an update to Sipekne'katik.	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
21.	April 21, 2015 letter from Chief Rufus Copage	TC#7.1 Did the approval holder report to NSE that the files had been provided to DNR? Please provide the date.	NSE	The approval holder did not report to NSE that the files had been provided to DNR.	P
22.	April 21, 2015 letter from Chief Rufus Copage	TC#7.1 Was the final location of the pipeline determined in consultation with DNR's Wildlife Division? Please provide the date.	DNR	Condition 7.1 is commonly applied in conditions for environmental assessment approval. The condition deals specifically with a code of practice to minimize impacts of the development on birds and other wildlife. It does not implicitly deal with the Wildlife Division making any determination of the specific location of the pipeline.	P
23.	April 21, 2015 letter from Chief Rufus Copage	TC#7.2 Site preparations that include deforestation, clearing and grubbing must be undertaken between September 1st and March 30th in order to minimize impacts on breeding birds that may include endangered and threatened species listed under the <i>Species at Risk Act</i> and/or the <i>Nova Scotia Endangered Species Act</i> , unless otherwise approved by NSE. Please confirm that this term and condition was followed.	NSE	The proponent anticipates being able to complete most clearing and cutting work during the winter months. However, if it is necessary for the proponent to carry out cutting and clearing work during the summer months, they must consult with the Canadian Wildlife Service and the NSNDR to develop a suitable monitoring and mitigation plan for breeding bird activities. Once finalized, this plan must be submitted to Nova Scotia Environment (NSE) for acceptance.	P
24.	April 21, 2015 letter from	TC#7.3	DNR CWS	The proponent will be required to conduct contingency measures to mitigate any impacts to breeding activity, as	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	Chief Rufus Copage	If site preparation activities occur between mid-July and August 31 <sup>st</sup> , the approval holder must prepare and implement a monitoring and mitigation plan for breeding activity (nesting) pursuant to the <i>Migratory Bird Convention Act</i> . Please provide a copy of this plan or confirm that site preparation activities did not occur during this period. If a plan was created, was it done in consultation with DNR and the Canadian Wildlife Service?		discussed above under TC#7.2. Further details will be included in the project EPP, which can be provided to Sipekne'katik when NSE receives it.	
25.	April 21, 2015 letter from Chief Rufus Copage	TC#7.4 Please confirm that the approval holder used natural species to re-vegetate exposed soil in forest and riparian zones.	NSE	Condition #7.4 is not applicable at this time.	P
26.	April 21, 2015 letter from Chief Rufus Copage	TC#7.5 This project falls within the area where 12% protected lands were identified. The EA speaks to the fact that these lands were set aside as a candidate in 2011. The two candidate patches were chosen due to their distinct features. Although this project originally began in 2007 as a storage facility, it would be known that at some point in the	PAB	Please see attached map titled 'Alton Gas Storage Lease and Pipeline Route including Stewiacke River and St Andrews River Wilderness Areas' to help visualize the area. As a result of a purchase of lands by the Province from Northern Pulp in 2010, nearly 3900 hectares of former Northern Pulp land in the St, Andrews River area became provincial Crown land. This land was included among the areas put forward for public review in 2011 as lands being considered for protection.	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
		future a pipeline would need to be constructed to bring the hydrocarbons to the facility. The loss of Crown lands is a loss of access to that land area.		Subsequently, a portion of this area was proposed not to be protected in favour of a nearby area currently privately owned (Our Parks and Protected Areas – A Plan for Nova Scotia, Province of Nova Scotia, 2013). Protection of this substitute area depends on provincial acquisition of the land, possibly through a trade. Whether this occurs or not, and whether all or only a portion of the area currently planned for protection is ultimately protected, there will have been a net increase of 3900 ha of Crown land in this area since 2009. The planned protected area would be a provincial wilderness area, which places restrictions on certain types of uses and motorized access but which still allows for traditional patterns of hunting, fishing, and trapping. Consultation with Sipekne'katik will be initiated in the upcoming months regarding St. Andrews River area.	
27.	April 21, 2015 letter from Chief Rufus Copage	TC#7.5 Sipekne'katik requests to be notified in writing for any and all project related activities proposed to occur on Crown lands.	NSE	NSE agrees to notify Sipekne'katik of any project related activities proposed to occur on Crown lands.	P
28.	April 21, 2015 letter from Chief Rufus Copage	TC#7.5 Did the approval holder contact DNR prior to any site investigations, construction, or project related access planned on Crown lands? Please provide the date(s) DNR was contacted by the approval holder.	DNR	DNR received an application for a Crown Land Easement on September 5, 2014. This application is currently under review.	P
29.	April 21, 2015 letter from	TC#7.5	DNR	DNR staff have not yet been provided with information as to whether wood turtle nesting surveys have been	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
	Chief Rufus Copage	Prior to construction, did the approval holder undertake wood turtle nesting surveys and avoid all nesting areas? Were any wood turtles found and reported immediately to DNR's Wildlife Division and the Regional Biologist?		conducted. Once this information has been received, NSE/DNR can provide it to Sipekne'katik.	
30.	April 21, 2015 letter from Chief Rufus Copage	TC#8.1 Did the approval holder obtain an approval from NSE for the wetland alterations as specified in the <i>Activities Designation Regulations</i> ?	NSE	The approval holder has not yet obtained approvals for wetland alterations. In the event that an approval is required for the gas pipeline, it will be shared with Sipekne'katik.	P
31.	April 21, 2015 letter from Chief Rufus Copage	TC#8.2 Did the approval holder provide GPS boundary coordinates and shape files of all wetlands delineated for the undertaking to NSE?	NSE	The approval holder has not yet provided GPS boundary coordinates for delineated wetlands. Once this information has been received, NSE can provide it to Sipekne'katik.	P
32.	April 21, 2015 letter from Chief Rufus Copage	TC#9.1 What programs will NSE require the approval holder to participate in regarding future air shed management?	NSE	The NSE has not required the approval holder participate in programs regarding air shed management.	P
33.	April 21, 2015 letter from Chief Rufus Copage	TC#9.2 The approval holder must not burn any materials generated as a result of construction activities. Is all	NSE	The approval holder must dispose of construction waste in an environmentally responsible manner. All solid waste generated as a result of construction activities will be properly sorted for recycling, reuse, composting, or	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
		construction waste disposed of in an environmentally responsible way? Does this term and condition prevent the approval holder from sending construction waste off-site to be burned at another facility?		landfilling. The segregated waste must be stored in a manner so they will not degrade, burn, or become buried on site until they are sent to the appropriate, provincially approved waste disposal, recycling or composting facility.  It is important to note that no construction waste has been generated yet and that this condition will be ongoing.	
34.	April 21, 2015 letter from Chief Rufus Copage	TC#9.3 Has NSE requested the approval holder to conduct air quality or dust monitoring?	NSE	NSE has not requested the approval holder conduct air quality or dust monitoring, but does have the authority to do so should it be required into the future.	P
35.	April 21, 2015 letter from Chief Rufus Copage	TC#10.1 Please provide a copy of the NSE Guidelines for the Formation of a Community Liaison Committee (CLC)	NSE	Please find a copy of these guidelines attached.	P
36.	April 21, 2015 letter from Chief Rufus Copage	TC#10.2 Please provide a copy of procedures for hearing and responding to community concerns during construction and operation.	NSE	NSE does not yet have this document. The NSE can provide it upon approval.	P
37.	April 21, 2015 letter from Chief Rufus Copage	TC#11.1 The approval holder must develop and implement a Mi'kmaq Communication Plan, which will include a process for communicating project details and seeking input from the Mi'kmaq community. A	NSE	The EA approval also includes a condition that requires the company to develop a communications process with the Mi'kmaq to ensure that project information is shared regularly and issues raised by the Mi'kmaq can be heard and addressed by the proponent. NSE understands the Sipekne'katik received a copy of the Mi'kmaq Communication Plan on March 17, 2015.	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
		copy of the Mi'kmaq Communication Plan (October 23, 2014) was received March 17, 2015.			
38.	April 21, 2015 letter from Chief Rufus Copage	TC#11.2 Sipekne'katik has requested to have a representative sit on the CLC.	NSE	The establishment of a CLC was not a requirement of the 2007 EA approval for the natural gas storage facility, but it is a requirement of the 2012 EA approval for the natural gas pipeline, if requested by NSE. Alton initiated the organization of a CLC in November 2014 and was soliciting interest from community members via an email sent on November 28, 2014.  NSE appreciates your offer to be included in this process.	P
39.	April 21, 2015 letter from Chief Rufus Copage	TC#12.1 The walkover for this study showed high potential for First Nation's archaeological resources. However, the shovel tests performed as part of this study resulted in no findings. Due to this high potential, was a professional archaeologist on site to monitor/oversee activities? Was a professional archaeologist on site to monitor/oversee specific activities undertaken in the dyke area? Please provide reports created by the archaeologist.	CCH	The high potential areas that were identified by the archaeologist were shovel tested and all shovel tests were negative.  Relevant Heritage Research Permits and related work are as follows: <ul style="list-style-type: none"> <li>• A2006NS58 (Background research and pedestrian survey)</li> <li>• EA 07-07-06 (recommended shovel testing of high potential areas and monitoring of dyke work)</li> <li>• A2008NS66 (pedestrian survey of Shubenacadie river to riverside road; shovel testing – negative)</li> <li>• A2011NS33 (Pedestrian survey of pipeline ROW; shovel testing high potential areas – negative)</li> <li>• A2014NS045 (permit for monitoring of mixing channel / dyke area)</li> </ul>	P and SF

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
				<p>The reports A2006NS58; A2008NS66; and a revised final version of A2011NS33 have all been reviewed and approved by CCH. A report for A2014NS045 is still outstanding from the archaeologist.</p> <p>The proponent is aware of need to have archaeological monitor on site for any work impacting the dyke. The archaeologist has been on site during the summer / fall of 2014 and has briefed construction staff on the archaeological contingency plan.</p> <p>The archaeologist was on site on July 9-11; August 5, 11, 22-23, 25<sup>th</sup> and, Sept 6. It was agreed at the outset of the project that archaeological monitoring would not be required full time for excavations outside of the existing dyke, but would be required full time for the dyke excavation.</p> <p>One small area of the dyke was impacted without the proponent having the archaeologist on site for monitoring sometime in August 2014. CCH sent a letter dated November 19<sup>th</sup> 2014 to reemphasize the requirement to have a permitted archaeologist in place for ANY excavation work on the dyke. To our knowledge there has been no work on the dyke since the November 19, 2014. CCH has an application from the archaeologist for 2015 monitoring work and has reviewed it but sign off will not</p>	



	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
				occur until consultation discussions have reached a satisfactory point.	
40.	April 21, 2015 letter from Chief Rufus Copage	TC#12.1 Please provide a policy document that would address what staff is required to undertake in the event that cultural resources are found on site during project activities. What training does on-site staff have with respect to identifying cultural resources?	CCH	The relevant document would be the Archaeological Contingency plan. The Archaeological contingency plan was prepared and included in the construction EPP. The proponent was made aware of the importance of the archaeology and the fact that it should stop if suspected resources were encountered. Please find a copy of this plan attached.	P
41.	April 21, 2015 letter from Chief Rufus Copage	TC#12.2 If an archaeological site or artifact of Mi'kmaq or suspected Mi'kmaq origin is unearthed, Sipekne'katik requests to be notified in writing. The Shubenacadie River System is a historic travel route used by the Mi'kmaq since before contact. The Mass House site is near this undertaking. The MEKS speaks to both historic and current use of the area.	NSE CCH	NSE / CCH agrees to contact the Sipekne'katik in writing should an archaeological site or artifact of suspected or actual Mi'kmaq origin be unearthed.	P
42.	April 21, 2015 letter from Chief Rufus Copage	TC#13.1 Prior to clearing and/or construction, did the approval holder submit the Emergency Response and Contingency Plan to	NSE	The approval holder has not yet submitted the Emergency Response and Contingency Plan to NSE. NSE can provide a copy of the document when it has been received.	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
		NSE for review and approval as required? Please provide a copy of the Emergency Response and Contingency Plan.			
43.	April 21, 2015 letter from Chief Rufus Copage	TC#13.2 In the event that NSE is contacted due to contaminated soil being discovered, it is requested that NSE inform Sipekne'katik in writing.	NSE	NSE agrees to inform Sipekne'katik in writing should contaminated soil be discovered on site.	P
44.	April 21, 2015 letter from Chief Rufus Copage	TC#14.1 A copy of the finalized abandonment plan is requested for review and comment 6 months prior to the permanent shut down of the project.	NSE	NSE agrees to provide a copy of the finalized abandonment plan 6 months prior to permanent shut down of the project.	P
45.	April 21, 2015 letter from Chief Rufus Copage	Hydro-geologic fracture (frac-out)" and "frac-out procedures" is referenced within the Alton EA (Alton Natural Gas Pipeline EA Registration, July 2012, Releases of Drilling Fluids or Hydrocarbon Spills, page 7.6). Where would these potentially occur, how often, are they reversible and what are the risks of this event to both the aquifer, fish and fish habitat and the surrounding community?	NSE	A Contingency Plan for Horizontal Direction Drilling (HDD) activities has been attached to this package for further details. This document was sent to DFO on May 29 <sup>th</sup> , 2014 for the water line Horizontal Directional Drilling as part of DFO's requirements for approval to NSE to issue the Watercourse Crossings permits for the water and brine pipelines.  In order to manufacture, sell, or distribute water treatment chemicals in North America (including drilling fluids used in the HDD industry), firms must comply with NSF/ANSI Standard 60: Drinking Water Treatment	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
				<p>Chemicals – health effects. Developed by a team of scientists, industry experts and key industry stakeholders, NSF/ANSI 60 sets health effects criteria for many water treatment chemicals including:</p> <ul style="list-style-type: none"> <li>• Well drilling fluids and additives</li> <li>• Corrosion and scale inhibitors</li> <li>• Coagulants and flocculants</li> <li>• Disinfection and oxidation chemicals</li> <li>• pH adjustment, softening, precipitation and sequestering chemicals</li> <li>• All other specialty chemicals used in drinking water treatment</li> </ul> <p>All fluids used in HDD must be certified to meet NSF/ANSI Standard 60. As such, these drilling fluids, when used according to the manufacturer's recommendation, will represent no health hazard to aquatic and terrestrial wildlife.</p>	
46.	April 21, 2015 letter from Chief Rufus Copage	The MEKS concluded that the project area has both current and historic use. What weight is given to a MEKS? Loss of traditional fishing, hunting, and gathering and use sites is a concern.	OAA	<p>Mi'kmaq Ecological Knowledge Study (MEKS) are an important tool within the EA process, which help to determine and analyze potential impacts of a project on Mi'kmaq land and resource use.</p> <p>The proponent completed a MEKS for the Storage Facility in December 2006 and another MEKS for the natural gas pipeline component in March 2012. The MEKS identified Mi'kmaq Traditional sites and areas, including hunting, fishing and harvesting in the Project area. These studies also highlight the Shubenacadie and Stewiacke Rivers as sources of several fish species harvested by the Mi'kmaq.</p>	P

	Reference for concern raised	Issue	Responsible Dept	Response	Pipeline (P) or Storage Facility (SF)
				The MEKS recommended that both the proponent and the Province meet with Mi'kmaq leadership and discuss the project within the context of Mi'kmaq traditional areas. Continued Crown consultation aims to fulfill this recommendation. The proponent has also committed to active engagement of Sipekne'katik First Nation and ongoing discussions.	

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

89

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

Action Date:

July 28, 2015

To

From:

Document Date:

McLean, Mark

Description:

**From:** McLean, Mark G

**Sent:** 2015-July-28 12:42 PM

**To:** King, Rhea L

**Cc:** MacNeil, Jack; Bradford, Rod

**Subject:** Alton Third Party Review Report and Meeting

Rhea:

Attached is the KMK third party review for the Alton Gas Project. The report is well done and supports DFO conclusions and recommendations (I've provided the parts noting DFO below). There are a few data gaps noted but these are relatively minor in nature for the most part. Two main items for discussion with the province and proponent will be the need to better define "peak" Striped Bass spawning periods (including identification when they are happening) and the need to assess the impact of the water intake on impingement of larvae fish (required as part of the monitoring plan). I've included all the recommendations from the report below.

We'll be attending a meeting tomorrow at NS Energy to go over the report with the proponent. Let me know if there are any questions. Thanks.

Mark

### QUOTES NOTING DFO

"Over the course of the planning and approval process, starting in 2007, the project has received extensive review from a variety of government sources, especially DFO."

"At several points in the record, DFO recommends and the proponent agrees that toxicity information for Striped bass will be produced. However, it has not yet been produced. To be most informative, the

bioassays should focus on replicating conditions in the mixing channel; i.e., mixing of real brine water with real Estuary water. DFO originally asked for bioassays with all life stages of Striped bass, but most recently asked for bioassays with only smaller life stages, which we believe is appropriate."

"A critical part of the approval process was the requirement for a baseline study of the eggs and larvae of the three native species of concern, Atlantic salmon, Atlantic sturgeon, and striped bass. Because striped bass eggs and larvae occur at and near the Site and are most likely to be impacted, these baseline studies focused on eggs/larvae. Subsequent fish stock studies completed for the Shubenacadie Estuary and River provided additional information on the ecosystem to meet DFO requirements."

"The potential toxicity of the brine to ambient biota has not been characterized even though this was a specific comment from DFO as part of the EA review process. Recommend completing bioassays of Striped bass eggs and larvae using diluted brine water (diluted using Estuary water) under various saline conditions to characterize potential toxic effects to fish at early life stages."

## **RECOMMENDATIONS**

These potential data gaps and associated recommended additional studies include the following:

- The major ion composition of the brine and brine-estuary water mixture is not known. Recommend collecting undiluted brine water as well as the brine water diluted with estuary water under various saline conditions to characterize the ionic composition of water potentially being discharge to the Estuary.
- The potential toxicity of the brine to ambient biota has not been characterized even though this was a specific comment from DFO as part of the EA review process. Recommend completing bioassays of Striped bass eggs and larvae using diluted brine water (diluted using Estuary water) under various saline conditions to characterize potential toxic effects to fish at early life stages.
- The EA supporting document estimated 14% of Striped bass eggs and fry passing the Site would be entrained in the intake channel. This estimate of entrainment is based primarily on water flows during a single ebb/flow. It does not take into account the potential for eggs and larvae to repetitively pass into the

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
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Receive Date: 2006/08/11  
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channel during ebb flow conditions resulting in an underestimate of potential entrainment and exposure of eggs and fry to the diluted brine discharge. Recommend that the planned monitoring of eggs and fry entrainment in the channel be conducted to validate the EA predictions using ichthyoplankton which will account for potential for repetitive entrainment.

- The recruitment of Striped bass within the Shubenacadie River and Estuary are not well understood and current factors causing success or failure of this fish species present limitations in its use as an indicator species for assessing potential effects related to the Project. Recommend that the proposed monitoring plan clearly define "peak spawning events" for discontinuing brine discharge and include a contingency to reduce lag times between sampling and analysis of eggs in the river. In addition, the plan needs to detail how natural variances in Striped bass recruitment in the river will be monitored and correlated to evaluate potential negative recruitment effects related to Project activities.
- In view of the very high concentrations of sediments in the Estuary, the potential for sedimentation and blinding of the mixing channel berm interstices is unknown and could potentially be significant, even with the airline. Blinding of the interstices of the rock pile would greatly reduce mixing of the brine prior to discharge to the channel's water column. The potential for this to happen is unknown. Recommend that modeling prior to construction and ongoing monitoring after construction occur to confirm the issue is not creating unacceptable impacts.

Action:

Information Provided

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:

0.00

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

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88

July 28, 2015

Correspondence - Do not go to Macro Access Screen  
MacNeil, Jack  
McLean, Mark  
Action ID No.:  
Action Date:  
Document Date:

Description:

**From:** McLean, Mark G  
**Sent:** 2015-July-28 11:16 AM  
**To:** MacNeil, Jack  
**Subject:** Fw: Alton Third Party Review Report and Meeting

Can you review. Not sure if you're around for a meeting tomorrow.

Mark

**From:** Sanford, Steve L [<mailto:Steve.Sanford@novascotia.ca>]  
**Sent:** Tuesday, July 28, 2015 10:49 AM  
**To:** McLean, Mark G  
**Subject:** RE: Alton Third Party Review Report and Meeting

See attached

**From:** McLean, Mark G [<mailto:Mark.McLean@dfm-mpo.gc.ca>]  
**Sent:** Tuesday, July 28, 2015 10:48 AM  
**To:** Sanford, Steve L [<mailto:Steve.Sanford@novascotia.ca>] <mailto:Steve.Sanford@novascotia.ca>  
**Subject:** Re: Alton Third Party Review Report and Meeting

Yes, do you have the report? We don't yet, left a message with Helen

I'll call later this morning or in the afternoon.

Mark

**From:** Sanford, Steve L [<mailto:Steve.Sanford@novascotia.ca>]



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

**Sent:** Tuesday, July 28, 2015 10:27 AM  
**To:** McLean, Mark G  
**Subject:** Alton Third Party Review Report and Meeting

Mark,

Are you available to discuss this in advance of tomorrow's meeting?

Steve

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Steve Sanford  
Nova Scotia Environment  
Environmental Assessment Branch  
1903 Barrington Street, Suite 2085  
PO Box 442  
Halifax, Nova Scotia B3J 2P8

Action:

Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:

0.00

Directory:

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Document Type (Upload):

11102228 Final Third Party Review Alton Natural Gas I

Other

File Extension:

File Size:

pdf  
334,404



**CONESTOGA-ROVERS  
& ASSOCIATES**

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**Final**

**Third Party Review**

**Alton Natural Gas LP Brine Storage and Discharge Facility Project**

**Prepared for: Kwilmu'kw Maw-klusuaqn Negotiation Office**

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## Table of Contents

	Page
<b>Section 1.0 Introduction.....</b>	<b>1</b>
1.1 Project Description .....	1
1.2 Existing Environmental Conditions .....	2
<b>Section 2.0 Methods .....</b>	<b>4</b>
<b>Section 3.0 Results .....</b>	<b>4</b>
3.1 Overreaching Observations .....	4
3.2 Scientific and Technical Completeness of Provided Information...	5
3.3 Existing Information for Similar Operation.....	7
3.4 Identified Uncertainties and Data Gaps.....	8
<b>Section 4.0 Conclusions and Recommendations.....</b>	<b>12</b>
<b>Section 5.0 Study Limitations .....</b>	<b>13</b>
<b>Section 6.0 References .....</b>	<b>13</b>

## List of Appendices

Appendix A List of Documents Provided by Alton Gas to KMKNO

## **Section 1.0 Introduction**

The Kwiilmu'kw Maw-klusuaqn Negotiation Office (KMKNO) retained Conestoga-Rovers & Associates (CRA) to review the Environmental Assessment Registration (EA) report and associated documentation for the proposed Alton Natural Gas LP Brine Storage and Discharge Facility Project (the Project). In this report, CRA focused on the review on the assessment of potential impacts of the proposed Project on fish and fish habitat of the Shubenacadie Estuary (Estuary) and upstream river area.

The purpose of the review is report is to:

- Complete a literature review of existing information for similar operations around the world, specifically, on solution mining, brine discharge requirements and the associated environmental impacts.
- Review the existing information to evaluate the scientific and technical information for completeness and for comparison to documented and validated scientific methods including the interpretation of the information with generally accepted standards of good scientific practice.
- Identify any information gaps and, if warranted, recommendations on how to address the information gaps.

The CRA team completing the documentation review and data gap analysis was selected from a team of environmental professionals that has experience in environmental assessments and aquatic ecology with specific project experience in natural gas storage projects involving brines and brine discharge.

### **1.1 Project Description**

The Alton Natural Gas storage project consists of the development of an underground hydrocarbon storage facility near Alton, Nova Scotia. As outlined in the Environmental Assessment Alton Gas prepared for the Nova Scotia Minister of the Environment, the main aspects of construction involved in the project are: the water intake and diluted brine discharge facilities; laying and connecting the water and brine pipelines; drilling vertical holes to initiate the creation of the salt caverns; and developing the salt caverns.

The water intake facility will take water from the Shubenacadie River which will then be used in the dissolution of the salt bodies under the site. This water will then mix with the dissolved salt from the deposit and be brought back to the surface creating cavern space for the storage of natural gas. This brine will then be stored in a brine pond before being discharged to a mixing channel constructed alongside the Estuary. The brine will be discharged via a diffuser pipe at

the bottom of the channel overtopped by coarse rock berm; this combination is designed to dilute the brine by an order of magnitude or more before the brine actually reaches the water column of the mixing channel. From the mixing channel the now diluted brine will then be released back into the river on a schedule that attempts to conform to the natural salinity fluctuations that occur in the estuary system.

Once construction of the caverns has been completed natural gas will be injected and withdrawn to meet market demands within the surrounding area. Through the development of this project, Alton Gas has prepared and submitted an Environmental Assessment Report in 2007, a report of additional information as requested by Nova Scotia Environment in 2007. An additional Environmental Assessment for the construction of a natural gas pipeline was completed in 2013. As of 2015, brine water pipeline and site facility construction has been completed and drilling at the cavern site has begun.

## **1.2 Existing Environmental Conditions**

The Alton Natural Gas site is located next to the Shubenacadie River, which is part of a very complex tidal estuary system. This Estuary is the source of water intake for the project as well as the location for brine discharge. As such, the conditions within the estuary, both environmental and biological, are of great importance to the project, since any positive or negative effects of the project will be experienced by the river Estuary system.

As part of the 2007 Environmental Assessment, Martec Ltd. completed a description of the Shubenacadie River, which is included in the Assessment; Appendix A, "Physical Description of the Shubenacadie River". Martec completed a field program in 2006 to establish trends in salinity, flow, and water elevation throughout the Shubenacadie-Stewiacke river system. Through this description Alton Gas obtained the majority of their data with regards to this system's salinity.

The Shubenacadie River is a tidal bore river in Nova Scotia, Canada. The Estuary experiences extreme changes in salinity, temperature, water elevation, suspended sediment and river bottom configuration over very short temporal periods (less than 1-hour). The river meander length is approximately 50 kilometers from its source at Shubenacadie Grand Lake to its mouth at Maitland on Cobequid Bay. The river system receives freshwater from a relatively large watershed area (2600 km<sup>2</sup>) that includes the Stewiacke River, a tributary to the Shubenacadie River. The confluence of the Stewiacke and Shubenacadie Rivers is located approximately 22 kilometers upriver of the latter's mouth. Due to the extreme tidal forcing (> 10 m large tidal range) from Cobequid Bay, the lower 30 kilometers of the river (Figure 1.0) of both rivers is tidal. Within this lower reach (tidal) of the river, the brackish water has salinities that can vary from 0 to 25 ppt over a single tidal cycle (Martec Ltd. 2007).

Due to the variance in salinity experienced in the Shubenacadie – Stewiacke Estuary it is home to diadromous, anadromous and catadromous fish species. It is also home to various invertebrate species. Three species found with the system are classified as being of concern; Atlantic salmon, Striped bass, and Atlantic sturgeon. Atlantic salmon are protected under the Species at Risk act (SARA), striped bass are listed as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and the Nova Scotia Department of Natural Resources (NSDNR) has red listed the Atlantic Sturgeon. Fish species that are known to spawn in the Estuary or the associated fresh water system include:

- Sea Lamprey
- Atlantic Sturgeon
- Brook Trout
- Atlantic Salmon
- Brown Trout
- Striped bass
- Gaspereau
- Blueback herring
- American shad
- Rainbow smelt
- Stickleback species
- Mummichog
- Atlantic silverside
- Atlantic tomcod
- Chain pickerel
- Yellow perch
- White perch
- American eel

Some benthic organisms present include microalgae, tube dwelling amphipod, *Corophium volutator*, and various worm species. Aquatic mammals which can be present include river otters, mink, harbor seals, and harbor porpoises.

Water intake facilities and brine discharge facilities were designed by Matrix Solutions Inc. for Alton gas and a design summary is included as Appendix B1 of the 2007 Environmental

**Assessment** The water intake facility will take 11,750 m<sup>3</sup> /day of water, of which 1750 m<sup>3</sup> /day will return directly to the river as discharge from the hydrocyclones, which remove most suspended matter. The brine discharge facility will take the brine returned from the caverns and store it in a pre-mixing pond before it is discharged to the mixing channel. The salinity of this brine before mixing is expected to be 260 ppt. No pumping would be required as non-tidal river flow enters the mixing channel and is then discharged during times of higher salinity flood tides.

## **Section 2.0 Methods**

CRA assembled a project team to complete a comprehensive literature review of existing information on the Alton Natural Gas project. The CRA team has carefully reviewed the documents Alton Gas provided to the province to obtain approval of their Environmental Assessments. The team has also reviewed all documents provided to KMKNO by Alton Gas and has created a table which summarizes the contents of all of these documents. (Appendix A) Review of the contents of these documents has led to the conclusions discussed within this report. A number of external documents were also consulted to contextualize the actions taken and decisions made by Alton Gas throughout the process of developing and registering their Environmental Assessment.

## **Section 3.0 Results**

### **3.1 Overreaching Observations**

In general, the EA methods and subsequent data provided by Alton have allowed the Nova Scotia Department of Environment and Labour (NSDEL) to make a decision for the Project to proceed. The following are some general observations on the EA documentation provided:

- The EA submitted for the project was generally completed consistent with the guidelines for NS Environmental Assessment Regulations and provided a logical approach in identifying potential impacts to environment and potential mitigation measures
- The EA submitted for the project was limited to development of the salt cavern for storage of natural gas as well as the brine discharge infrastructure but did not include an evaluation of the construction of a natural gas pipeline from the Maritimes and Northeast pipeline to the storage cavern. A separate EA for the natural gas pipeline was to be submitted to the NSDEL. The splitting of project components into separate EAs is atypical and does not allow for the evaluation of overlapping effects from the proposed project or potential cumulative effects

- Cumulative effects from the proposed project and other on-going projects in the area were not specifically addressed in the EA report but were considered to be negligible as part of subsequent correspondence.

### **3.2 Scientific and Technical Completeness of Provided Information**

Over the course of the planning and approval process, starting in 2007, the project has received extensive review from a variety of government sources, especially DFO. As part of the long-term and on-going consultation, potentially critical environmental issues identified were impacts on fish stocks and fish habitat. Of special concern were potential impacts on three species of concern: Atlantic salmon, Atlantic sturgeon, and Striped bass. However, other species of fish and invertebrate prey species were considered in various background documents. Based on consideration of the project, several potential impacts of the project were noted: potential disruption of upstream migration of anadromous fish by alteration of the river's bouquet; potential entrainment and impingement of fish associated with water withdrawals; toxicity of brine/estuary water mixtures; and impacts on sediment loads. Other issues considered, and then quickly dismissed, were significant effects on salinity of the Estuary and the thermal regime of the Estuary.

In response to these concerns, the project has taken an interactive and collaborative approach to assessing potential impacts. Thus, potential risks to fish were screened first based on available life history information and on the assumption that very small life forms, such as fertilized eggs (eggs) and very early life stage larvae, would be most sensitive to effects. These very life stages are typically planktonic, which means they are carried around largely by ambient water currents rather than active locomotion. In contrast to the ichthyoplankton, larger larval, juvenile, and adult fish can typically swim fast enough to avoid impingement, entrainment, and plumes of potentially toxic brine mixtures. Given this background, potential effects on many resident fish species could be, and were, dismissed in early stages of this process because those species do not spawn or have vulnerable eggs/larvae near the Site.

In contrast, Striped bass do have eggs/larvae near the Site so this basic screening process focused attention on Striped bass. Striped bass are a species of concern in the Estuary and also an important part of the fishery. These fish are known to spawn upstream in the Stewiack River, and their eggs and developing larvae are subsequently carried down to the Estuary alongside the Site, potentially into harms way. However, the specifics of spawning and life history dynamics of bass in the Estuary were not well known. The Shubenacadie Estuary differs in important respects from other estuaries in which bass spawn, so an early recommendation of regulatory reviewers was that more information on the temporal and spatial distribution of Striped bass eggs needed to be obtained. This recommendation was a specific condition of the Nova Scotia Environment approval.



*"A plan to gather baseline information on water temperature and the presence of Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae during one spawning season prior to the commencement of solution mining".*

Although consideration of life history characteristics indicated the salmon and sturgeon eggs/larvae would not likely be impacted, the directive for further study included these two additional species. Although the rationale for this is not stated, it is likely because these two populations are so precarious that even low levels of uncertainty about potential impacts were considered unacceptable.

In response to this directive/recommendation, a detailed and continuing monitoring program has gathered baseline information of the last 7 years and counting. The physico-chemical information includes not just water temperature but salinity and flow. The sampling of biota has focussed on times and locations most pertinent to Striped bass, but the detailed sampling of eggs, fry, and juvenile fish has also sought the presence of salmon and sturgeon. As was predicted by life history considerations but also their very small populations, salmon and sturgeon eggs and larvae were apparently never observed in the rather extensive sampling.

This collected information (since 2007) has greatly expanded the knowledge base concerning Striped bass dynamics and to lesser extent, their prey in the Shubenacadie Estuary. Based in part on the last seven years of sampling, it is now well established that this stock is currently as numerous as it has been in decades. At the same time, these detailed studies suggest that the Shubenacadie population is vulnerable. Nova Scotia is at the edge of the habitat range for Striped bass, and the Estuary poses additional significant constraints on bass recruitment.

Although all the factors causing successful or failed recruitment are not well established, very good recruitment probably relies on succession of favorable weather conditions all of which must occur. Thus, weather conditions must sequentially spur good spawning, good retention in the Estuary, and provision of adequate densities and types of prey at appropriate locations and times in bass larval development. Even if all of these propitious events occur in the same year, age zero fish in this northern climate have a very short period in which to grow to a size sufficient to allow over-wintering. Thus, recruitment in the Estuary tends to fail in many years; the currently large population of Striped bass is thought to be due almost entirely to one or two very good year-classes, rather than constant successful recruitment per year. During the intensive sampling of eggs and fry, even though populations of adult fish are high, recruitment has probably been low because all essential conditions have not been optimal.

### 3.3 Existing Information for Similar Operation

Largely because of the enormous tides, the physico-chemical environment present in the Bay of Fundy and the Shubenacadie River are very unique. The massive tidal force of the bay influences the Shubenacadie River, making the Estuary a somewhat unique environment in a way that has very few analogous environments. As such, a single analogous project was not found in available literature for comparison to the Alton Project. However, aspects of various projects, including biological and environmental chemistry components, can be used for comparison purposes and described in the following paragraphs.

Projects that have similar aspects of brine discharge are various desalination projects which often discharge into near shore tidal environments. Alton Gas' research and design of the discharge facility has taken into consideration and referenced existing mathematical models of brine desalination such as the work of D.D. Shao's "Brine discharge into shallow coastal waters with mean and oscillatory tidal currents".

Numerous papers and studies exist which attempt to determine the effects of salinity changes on fish species. With the introduction of a brine to the area surrounding the project site some species, at various life stages, could be exposed to slight or potentially higher salinity changes near the outfall area. Species found in the Shubenacadie River and associated estuary are regularly exposed to a change in salinity of 0-30 part per thousand (ppt) due to the 30 km tidal influence from the Bay of Fundy. Therefore many of the fish species in the River have the ability to adapt to changes in salinity and may be unaffected by the changes in salinity. A study completed by Hiroi, and McCormick exposed lake trout, brook trout, and Atlantic Salmon directly to 30 ppt salinity waters, and gradually to 10, 20, and 30 ppt waters. Atlantic salmon, which are of concern in the project area, showed a 100% survival rate to both experiments. Brook trout, which are also present, had a 50% survival rate in the direct exposure scenario and 100% in the gradual exposure experiment. This study does not help to understand effects on recruitment or growth but does indicate dramatic increases in salinity are acutely lethal to some salmonid species.

A study from Mississippi State University in collaboration with the University of British Columbia produced a paper intitled "Salinity affects on Atlantic Sturgeon". In this study, juvenile Sturgeon were exposed to waters ranging in salinity from 0-33 ppt. The Sturgeon were identified to have the ability to grow and adapted to salinity changes up to 30 ppt. Salinity concentrations greater than 30 ppt were tolerated by sturgeon but concentrations higher than that inhibited growth. Fish were on average 10 cm shorter and 5 kg smaller (sturgeon can grow up to 370 kg and 4.3 m). The effects on juveniles is important as Atlantic Sturgeon may travel up the Shubenacadie River to spawn thus exposing the juveniles to conditions near the project site.

### **3.4 Identified Uncertainties and Data Gaps**

#### ***Major Ion Composition of Brine***

The major ion composition of the brine and brine-estuary water mixtures are not apparently known. According to several reports in the provided information, the salt deposits are almost entirely sodium chloride, but analytical data reports of the concentrations of other major ions were not available in the literature reviewed. This is important because although dissolved solids in ocean water are largely sodium chloride, ocean water also includes significant concentrations of other biologically active ions, notably potassium, magnesium, calcium, and sulfate. Aquatic species may, therefore, be impacted by changes in salinity and also by changes in the ionic composition of salinity. We believe this to be a minor datagap. The brine will be diluted by an order of magnitude or more in the mixing channel, so it is unlikely that ionic differences between brine and Estuary water would be biologically meaningful. However, this datagap can be filled easily; the chemical analyses are inexpensive and easily done. Therefore, the ion composition for various mixtures of brine and estuary water should be tested with a range of Estuary water salinities that would be taken in for mixing. Ironically, if ion composition is a critical factor in fish effects, the effects of brine might be most extreme during periods of very low salinity in the Estuary adjacent to the Site and resulting relatively low salinity in the brine/river water mixture. In addition, if there is a potential that salt/brine quality varies from cavern to cavern or within the same cavern, this potential datagap can be easily addressed by chemical analyses suggested above.

#### ***Determination of Toxicity of Brine-Estuary Mixture to Fish***

Along the same lines, the potential toxicity of the brine/estuary mixture to ambient biota has not been established. At several points in the record, DFO recommends and the proponent agrees that toxicity information for Striped bass will be produced. However, it has not yet been produced. To be most informative, the bioassays should focus on replicating conditions in the mixing channel; i.e., mixing of real brine water with real Estuary water. DFO originally asked for bioassays with all life stages of Striped bass, but most recently asked for bioassays with only smaller life stages, which we believe is appropriate. However, because very small organisms are much less mobile and, because of their size, much quicker to equilibrate with abrupt changes in water quality, potential effects on eggs, larvae, and juveniles are the more important datagaps.

#### ***Alteration of the Estuary's Bouquet and Disruption of Anadromous Fish Spawning***

The issue of the brine addition affecting homing of anadromous fish is also a data gap. The potential concern here is based on the fairly well established hypothesis that salmon, and maybe other fish, smell the way back to their natal tributary. This potential effect is discussed but not really addressed in the provided information (and given the small numbers of salmon,

may not be addressable with any sampling). However, this is considered a minor datagap for two reasons. First, the contribution of brine to the bouquet of smells at the mouth of estuary will likely be negligible since the brine will make up such a tiny proportion of the water at the mouth. Second, the science on the importance of olfaction in anadromous fish homing is unsettled. As with many rivers discharging to the Ocean, the bouquet of smells at the mouth of the Shubenacadie Estuary will vary dramatically from time to time depending on the amount of upstream river flow. Thus, recent analyses suggest that salmon use a combination of homing methods – magnetic fields for migration in the ocean to the mouth of the natal stream and, once in natal estuary, olfaction to determine the natal tributary. If this latter theory is true, potential effects on anadromous fish will be non-existent since the brine discharge cannot effect the earth's magnetic field, and the point where olfaction becomes critically important occurs upstream of the brine discharge.

### ***Potential Effects of Entrainment and Impingement on Ichthyoplankton***

The issues of entrainment and impingement of ichthyoplankton are data gaps. However, effects of entrainment and impingement for water taken to the caverns is very likely negligible since the volumes of water are also very small. Entrainment of eggs and larvae in the mixing channel could be potentially significant only if both the following are true: 1) a significant number of eggs and larvae are entrained into the mixing channel and 2) the brine-river water mixture is either poorly mixed and/or acutely toxic after mixing in the channel. According to the EA supporting documentation, the mixing channel may entrain about 14% of the eggs and fry, so the potential effects are assumed to be limited even if the brine were toxic. However, this estimate is beset by two antagonistic uncertainties. First, the estimate of 14% of eggs/fry being entrained in the mixing channel pertains to a single ebb flow. However, at lower upstream river discharges, the same group of eggs might pass the site repetitively and, thus, have a potential of being entrained into the mixing channel for each ebb flow. Thus, the estimated 14% chance of being entrained and exposed to brine mixture might significantly underestimate the total potential for entrainment/exposure. Second, the current plan calls for stopping brine discharge during peak spawning times. If this is done, entrainment AND exposure to brine in the mixing channel would be less than 14% of total eggs/fry, albeit only during each ebb flow. As such, to alleviate the datagap associated with point number 1 above, potential entrainment in the mixing channel should be estimated for ichthyoplankton which accounts for the potential repetitive entrainment during repeated ebb flows. The datagap for point number 2 can be addressed with chemical analyses of the brine-estuary mixture and/or fish toxicity studies recommended above.

### ***Understanding Critical Factors Causing Success or Failure of Striped Bass Recruitment***

The exact factors causing success or failure of Striped bass recruitment is potentially a significant data gap. Despite intensive sampling over now several years, the critical factors

affecting Striped bass recruitment are not fully understood. The now fairly extensive information suggests that total egg released and fertilized may be affected by the weather. Near-term survival of the fertilized eggs and of early larvae is probably largely dependent on subsequent rainfall and runoff. Heavy rains/high runoff soon after spawning presumably carries the fertilized eggs and larvae out of the estuary, where temperatures, salinities, and prey densities are suboptimal. Assuming that fertilized eggs and larvae are not prematurely flushed out of the Estuary, subsequent survival and growth for juvenile bass is presumably a function of prey densities. The densities and distribution of the critical first prey, copepods and then major prey of large fry, mysids, are also a not-well understood combination of dependent of rivers flows and water temperature. Hence, very successful bass recruitment may depend on the simultaneous occurrence of several unrelated weather events, which means that recruitment success is both very sporadic and currently difficult to predict.

The naturally precarious nature of Striped bass recruitment has antagonistic effects on the effectiveness of the long-term monitoring program. Notably, meager recruitment during brining operations is not strong evidence of impacts since recruitment is often poor for other reasons. Without understanding why recruitment failed, it would be difficult to require significant changes to the project or even what those changes should be.

Unfortunately, this datagap cannot be filled easily. Despite almost 7 years of detailed sampling, the scientists still do not fully understand factors controlling recruitment. Nonetheless, filling other datagaps and results of during-project monitoring will reduce the uncertainty associated with this data gap. Thus, for example, a better understanding of brine ionic composition, its potential toxicity, and success of mixing of brine/estuary water in the mixing channel could help dismiss brine discharges as a significant cause of bass mortality. Similarly, the ichthyoplankton will be monitored at several locations during project operation, and these data can also be useful in determining whether the project could cause significant effects.

#### ***Definition and Determination of Peak Spawning Events During Which Brine Discharge Will Be Curtailed***

The current sampling plan suggests that brine discharge will be discontinued during "peak spawning events". However, it is unclear how "peak spawning events" will be defined and determined effectively. Based on extensive sampling already conducted, it is likely that "peak" will be defined as some threshold of eggs and planktonic larvae per volume of Shubenacadie River water at the Site or flow across the Site per time. The specific values should be provided. A second datagap that should be filled is how this will be effectively determined. The following factors suggest that a major spawning event might be well underway, along with ongoing brine discharge, before it was noticed with the sampling plan. Thus, spawning events can be short-lived, there may be several days interval between samples (planned samples are every 4 to 5 times per week), and there appears to be some lag between sampling and analysis of eggs. This

is probably not a major data gap because major spawning activity by adult fish is apparently obvious, at least during the daytime, and somewhat predictable by water temperature and date. Given this, samples might be taken more often, and with fewer consecutive days without samples, during periods of observed or likely spawning. With appropriate labor, the lag time from sampling to analysis and results can be set to some minimum (e.g., next day or sooner after sampling) to minimize the lag between sample and results.

#### ***Impacts on Atlantic Salmon and Atlantic Sturgeon Are Uncertain***

Given their small, precarious populations, potential impacts on both Atlantic salmon and Atlantic sturgeon will be both difficult to measure and have a very low tolerance. Even impacts on a small numbers of individuals may be too much, although they will be very difficult to discern. As described several places in the reviewed information, Project-related impacts on these two species are quite unlikely because of their life histories and the negligible effects of the project on physio-chemical environment of the Estuary. Nonetheless, a condition imposed for this project was that there be baseline monitoring of eggs and larvae of these two species.

Although monitoring specifically for salmon and sturgeon was not apparently done, a very considerable amount of monitoring of fish eggs and fry in the Estuary was conducted since 2007. At least some of these analyses looked for salmon and sturgeon. Thus, for his Masters thesis, Reesor took over 554 plankton net tow samples between 13 May to 6 November 2008 and 5 May to 28 October 2009. Neither Atlantic salmon nor Atlantic sturgeon were caught during this rather intensive study. These negative results support the conclusion that sensitive eggs and larvae of these two species will not occur in the area affected by the project. There also is some sampling planned to determine whether salmon smolts enter the mixing channel, but CRA could not find any information at all on past or planned sampling for Atlantic Sturgeon.

#### ***The Potential for Sediment Fouling of Rock Berm/Diffuser is Unknown***

The current plan is to discharge the brine to a diffuser pipe buried below a coarse rock berm in the middle of the mixing channel. The combination of the diffuser and flow through the coarse rock berm are estimated to dilute the brine by more than an order of magnitude prior to the brine reaching the water column. An airline will also be installed in the berm to add additional mixing if monitoring shows insufficient mixing of brine or "to help flush out sediment." In view of the very high concentrations of sediments in the Estuary, the potential for sedimentation and blinding of the berm interstices is unknown and could potentially be significant, even with the airline. Blinding of the interstices of the rock pile would greatly reduce mixing of the brine prior to discharge to the channel's water column. The potential for this to happen is unknown. However, this data gap can potentially be reduced with some sort of modeling prior to construction and ongoing monitoring after construction.

## Section 4.0 Conclusions and Recommendations

In accordance with CRA's scope of work, the literature provided by KMKNO pertaining to the proposed Alton Project was reviewed as well as available information on similar development projects. Based on CRA's review, the EA registration document was completed in general accordance with NSDEL requirements. A critical part of the approval process was the requirement for a baseline study of the eggs and larvae of the three native species of concern, Atlantic salmon, Atlantic sturgeon, and striped bass. Because striped bass eggs and larvae occur at and near the Site and are most likely to be impacted, these baseline studies focused on eggs/larvae. Subsequent fish stock studies completed for the Shubenacadie Estuary and River provided additional information on the ecosystem to meet DFO requirements. These additional studies were generally completed using defensible scientific methods, and the data obtained used to develop mitigation strategies to minimize potential effects to the environment. However, the paucity of similar salt cavern development projects with brine discharges to estuaries limited the comparative environmental impact evaluation among similar operations.

Although the Project EA and subsequent studies have provided substantial information on the status of selected fish stocks and fish habitat within the Shubenacdie River and Estuary, CRA has identified several potential data gaps specific to the monitoring and evaluation of effects of the project on fish and fish habitat. These potential data gaps and associated recommended additional studies include the following:

- The major ion composition of the brine and brine-estuary water mixture is not known. Recommend collecting undiluted brine water as well as the brine water diluted with estuary water under various saline conditions to characterize the ionic composition of water potentially being discharge to the Estuary.
- The potential toxicity of the brine to ambient biota has not been characterized even though this was a specific comment from DFO as part of the EA review process. Recommend completing bioassays of Striped bass eggs and larvae using diluted brine water (diluted using Estuary water) under various saline conditions to characterize potential toxic effects to fish at early life stages.
- The EA supporting document estimated 14% of Striped bass eggs and fry passing the Site would be entrained in the intake channel. This estimate of entrainment is based primarily on water flows during a single ebb/flow. It does not take into account the potential for eggs and larvae to repetitively pass into the channel during ebb flow conditions resulting in an underestimate of potential entrainment and exposure of eggs and fry to the diluted brine discharge. Recommend that the planned monitoring of eggs and fry entrainment in the channel be conducted to validate the EA predictions using ichthyoplankton which will account for potential for repetitive entrainment.

- The recruitment of Striped bass within the Shubenacadie River and Estuary are not well understood and current factors causing success or failure of this fish species present limitations in its use as an indicator species for assessing potential effects related to the Project. Recommend that the proposed monitoring plan clearly define “peak spawning events” for discontinuing brine discharge and include a contingency to reduce lag times between sampling and analysis of eggs in the river. In addition, the plan needs to detail how natural variances in Striped bass recruitment in the river will be monitored and correlated to evaluate potential negative recruitment effects related to Project activities.
- In view of the very high concentrations of sediments in the Estuary, the potential for sedimentation and blinding of the mixing channel berm interstices is unknown and could potentially be significant, even with the airline. Blinding of the interstices of the rock pile would greatly reduce mixing of the brine prior to discharge to the channel’s water column. The potential for this to happen is unknown. Recommend that modeling prior to construction and ongoing monitoring after construction occur to confirm the issue is not creating unacceptable impacts.

## Section 5.0 Study Limitations

CRA was provided data from KMKNO for this review that has been relied upon for the conclusions reached in this report. CRA also used publically available information as referenced in the report that has been relied upon. This report is intended solely for the Client(s) named. The material in it reflects our best judgement in light of the information available to CRA at the time of preparation. No portion of this report should be used as a separate entity, as it is written to be read in its entirety. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, is the responsibility of such third parties.

## Section 6.0 References

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Putman, N.F., E.S. Jenkins, C.G. Michielsens, and D.L. Noakes. 2014. Journal of Royal Society Interface. Geomagnetic imprinting predicts spatio-temporal variation in homing migration of pink and sockeye salmon. Oct 6;11(99).

## **Appendix A**

### **List of Documents as Provided by Alton Gas to KMKNO**

s.19(1)

Name	Author/Publisher	Date	Description	Source	Assignment
Meeting Summary from meeting with NSEL, DFO, Municipality of Colchester	[REDACTED]	13-Oct-06	Meeting Summary from Aug 30, 2006 meeting with NSEL, DFO, Municipality of Colchester. Alton and Jacques Whitford present Project overview, Regulatory Requirements, Research Status, Scope of Assessment, plans for public consultation and first nation involvement.	KMKNO	
Agenda from meeting with NSEL, DFO, Municipality of Colchester (includes info sheet)	AltaGas Ltd.	30-Aug-06	Includes Project Overview, Schedule, Environmental Planning Process, Regulatory Framework, Public consultation, Environmental and Socioeconomic Scoping (summaries of proposed VECs and rare species surveys)	KMKNO	
Alton Open House invitation	David Birkett (AltaGas Ltd.)	9-Nov-06	Email correspondence with DFO and public invitation to Nov 22, 2006 Public Open House in Brookfield	KMKNO	
Aquatic Environment Discussion Paper Draft	[REDACTED] (Jacques Whitford)	24-Jan-07	Notes for Jan 24 2007. General, fairly detailed, Project Description followed an update on the progress of EA preparation, Description of Existing conditions (Shubenacadie River, Stewiacke River, Estuary, Cobequid Bay and Tidal conditions, descriptions and current conditions of fish species such as Bass, Salmon, and Sturgeon as well as their relationships with salinity) and a list of seven (7) potential environmental interactions which Alton would be focused on	KMKNO	
Meeting Notes from meeting between JWEL, Landis Energy, and DFO	AltaGas Ltd.	24-Jan-07	Proponent proposes diffuser options, DFO notes challenges with using effluent ponds. DFO suggests proponent completes species list and analyzes spawning seasons. Salinity levels from releasing brine into the ocean becomes main topic. DFO notes that there are a few uncertainties with the project but no major issues	KMKNO	
Note to File	Department of Fisheries and Oceans (DFO)	8-Mar-07	DFO summary of Jan 24, 2007 meeting with Alton Gas. Includes Conceptual Draft of the project site around the Shubenacadie and Stewiacke Rivers.	KMKNO	
Draft EA Document (first Page) [MEMO]	Vanessa Margueratt, Environmental Assessment Officer (DFO)	16-Apr-07	Memo attached to DRAFT Environmental Assessment and circulated to DAF, EC, CEAA, DNR, and NSEL	KMKNO	
Striped Bass Egg ... Monitoring Proposal	[REDACTED] (Jacques Whitford)	16-May-07	Jacques Whitford proposal to DFO to conduct a study determining the abundance of striped bass eggs and larvae in the Shubenacadie Estuary.	KMKNO	
Review of Striped Bass Egg...Monitoring Proposal	DFO	?/?/2007	DFO response to Jacques Whitford Striped Bass monitoring proposal, includes a number of proposed changes	KMKNO	
Striped bass Egg...Monitoring Email & Figure	[REDACTED] Rod Bradford, Melanie MacLean (DFO & Jacques Whitford)	May-07	Rod Bradford (DFO) email response to Jacques Whitford proposal to conduct bass studies. Includes graphs of Striped bass egg production	KMKNO	
DFO Prelim Comments to Vanessa Marguratt	Melanie MacLean (DFO)	25-May-07	Email to NSEL from DFO including comments from DFO on the Draft report- Environmental Registration for the Proposed Alton Natural Gas Storage Project	KMKNO	

Name	Author/Publisher	Date	Description	Source	Assignment
EA Final Report (First Page)	Candace Harding (For DFO)	9-Jul-07	DFO receives final report Environmental Registration for the Proposed Alton Natural Gas Storage Project as prepared by Jacques Whitford for Alton Gas	KMKNO	
Scientific Review of Environmental Registration Documents	DFO	Jul-07	DFO Maritimes Science Branch review of Environmental Assessment Registration Document for the Alton Natural Gas Storage Proposal on May 24, 2007. DFO concluded that the Environmental Registration did not present sufficient information to enable full evaluation of a risk assessment of potential impacts to species at risk. Recommended a DFO led peer review meeting to discuss additional mitigation and monitoring options.	KMKNO	
Letter to Vanessa Margueratt (NSE)	Melanie MacLean (DFO)	Jul, 2007	DFO communicates that "Final Report, Environmental Registration for the Proposed Alton Natural Gas Storage Project" July 14 2007 failed to provide adequate information to support predictions that Fish and Fish habitats in the area would be unaffected by proposed work. Three main concerns 1) Withdrawal of water from Shubenacadie River 2) Brine Discharge into Shubie River 3) Sediment Discharge in Shubie River	KMKNO	
Mark Parent Letter in Responses to EA	Mark Parent (NSEL)	31-Jul-07	Letter from the Minister (Mark Parent) to Alton Gas requesting additional information on Fish and Fish habitats as well as details of discussions with First Nations before a final decision can be made.	KMKNO	
Draft Agenda working Sheet	AltaGas Ltd.	19-Sep-07	Draft Agenda for Alton meeting with NSEL/DFO to provide information as requested by the Minister	KMKNO	
Design Concept Drawings	Wlm M. Veldman (for AltaGas)	19-Sep-07	Draft Design Drawings of the Mixing Channel and the Intake.	KMKNO	
Environmental Discussion Paper	AltaGas Ltd.	???	Unfinished draft discussing Salt Geology, Source of leach water, Cavern Mining Discussion, Water Treatment, Plant water and Brine Handline, Insolubles encountered during mining, Brine Return, Mining Operation, and Safety and Control Instrumentation.	KMKNO	
Field Data Overview	Jim Warner (For AltaGas Ltd.)	Sept, 2007	Presentation on field research conducted between June and September 2007. Graphs on Salinity, Rainfall effects, and Tidal Cycle. No written details mostly images.	KMKNO	
Hydrotechnical Assessment	(for AltaGas Ltd.)	Sept, 2007	Hydrotechnical Assessment of the Outfall and Intake Facilities Shubenacadie River. Presentation covering Hydraulic and saline characteristics of the Shubie River. Outlines options for outlet/Discharge Facility includes rationale for design selection. Includes modeling for salinity levels during discharge (1 day, 2 weeks, constant brine discharge variable brine discharge, etc.). Description of water intake facilities	KMKNO	
Surface Facilities & Cavern Engineering	Bob Ramsay (for AltaGas Ltd.)	???	Presentation on Brine disposal options, leach water sources and solution mining. Small presentation mostly images, no real written details.	KMKNO	

Name	Author/Publisher	Date	Description	Source	Assignment
Working Session Summary	Vanessa Margueratt	19-Sep-07	Table of Question and Answer discussion following the presentations listed above and others presented at that time. Outlines discussion primarily between DFO and Alton	KMKNO	
Alton Gas Project Biological Impact Statement (title page)	Thaumas Environmental	16-Nov-07	TITLE PAGE ONLY (Full Document at bottom of List)	KMKNO	
EA Report Supplemental information (title page)	Jacques Whitford	23-Nov-07	TITLE PAGE ONLY	KMKNO	
DFO Supplemental EA Info Review	Attila Potter (DFO)	11-Dec-07	DFO's review of the supplemental information Alton provided at the request of the Minister. DFO was still not comfortable providing final impact predictions and asked for additional information. DFO requests more information on sedimentation, salinity, and flow alterations.	KMKNO	
Mark Parent Approval Letter	Mark Parent (NSEL)	18-Dec-07	Minister approves Environmental Assessment upon review.	KMKNO	
NSE EA Approval	NSEL	18-Dec-07	Terms and Conditions for Environmental Assessment Approval	KMKNO	
Approval 2008-061384 (Brine Storage Pond)	Wayne Faulkner (NSEL)	18-Jun-08	Approval from NSE to construct and operate the Brine Storage Pond, Phase 2 Site Preparation and Well Drilling. Terms and Conditions of the Approval	KMKNO	
Data Collection & Effects Monitoring	AtlaGas Ltd.	7-Aug-08	Chart summarizing Data Collection plans for water quality around the Water Intake Structure, Mixing Channel, and Estuary.	KMKNO	
Intake Facility & Skid Location	AtlaGas Ltd.	???	Design Plans for Intake Facility and Skid.	KMKNO	
Note to File	DFO (HPSD)	5-Dec-08	Summary of DFO and Alton studies of striped Bass in the Shubenacadie River.	KMKNO	
Note to File	DFO (HPSD)	16-Jan-09	Summary of DFO and Alton meeting. Topics covered: Data Sharing Agreement, Striped Bass, Historical Data, DFO recommendations to Alton about Sampling, Elvers, Beach Seine Suggestions, Hydrophone use, Salmon Smolts, Channel Construction, and Tom Cod.	KMKNO	
2008 Alton Report FINAL March 2009 (title page)	AtlaGas Ltd.	25-Mar-09	Shubenacadie River Survey 2008: Striped bass and other fish and Invertebrates. Abstract only. Discusses bass egg quantiles as well as mysid shrimp due to their relation to salinity.	KMKNO	
DFO Catch Report 2008-451	DFO	Nov, 2009	Data tables of striped bass eggs, larvae and young caught between May 16 and November 13 2008. Also contains table of species caught other than striped bass.	KMKNO	
DFO Request for Additional Information	(HPSD)	3-Sep-09	Request for Alton to provide DFO with details on the final design of the infrastructure around the Shubenacadie River outlined in the EA.	KMKNO	
Plan for Mixing Channel & Cross Section	Matrix Solutions Inc.	2009	Design plans/drawing for Mixing Channel with cross section	KMKNO	
Plan for Mixing Channel	Matrix Solutions Inc.	2009	Design plans/drawing for Mixing Channel	KMKNO	
Duston Letter to Claytor	Jim Duston (NSAC Department of Plant and Animal Science)	9-Dec-09	Dr. Jim Duston of the NSAC provides a summary of the work conducted under license # 322475 to collect striped bass eggs and rear larvae to conduct masters level research at Dalhousie U.	KMKNO	

Name	Author/Publisher	Date	Description	Source	Assignment
Alton report Final Dec 15 2009 (title page)	C. Reesor and J. Duston (NSAC Department of Plant and Animal Science)	11-Dec-09	Abstract from "Shubenacadie River Survey 2008 & 2009: Striped bass and Mysid abundance at the Alton diversion site, a summary report. Paper compares 2008 and 2009 striped bass egg, larvae, and juvenile populations and notes that there were more eggs in 09 but fewer larvae and juveniles due to higher rainfall, and interactions with tide heights and water temperature.	KMKNO	
Temp & Salinity Effects Journal Article	Cooke, Duston, and Bradford (Published by American Fisheries Society)	2010	"Temperature and Salinity Effects on Survival and Growth of Early Stage Shubenacadie River Striped Bass" Published article based on research using striped bass determining ideal temperature and salinity levels for growth.	KMKNO	
Data Use Agreement	DFO/AtlasGas Ltd.	12-Jul-10	Agreement between DFO and Alton with regards to releasing Data files from Alton developed hydrophones.	KMKNO	
DFO Letter of Advice	Melanie MacLean (DFO)	5-Nov-10	Letter From DFO stating that the Alton proposal is not likely to contravene the Habitat Management Program of the Fisheries Act or the Species at Risk Act and that no formal approval from DFO is needed to proceed with developments along the Shuble River.	KMKNO	
Catch Report Jan 2011 Duston	Jim Duston (NSAC Department of Plant and Animal Science)	21-Jan-11	Catch report for License #325881 sampling from May 13 to September 27 2010 on the Shuble River. Striped Bass, plankton, flounder, elvers, tom cod, gaspereau	KMKNO	
Salmon and Striped Bass Data	Melanie MacLean (DFO)	1-Feb-11	Raw Tag Data for Atlantic Salmon and Striped Bass	KMKNO	
Shubenacadie River Survey 2010 (title page)	G.Stewart J.Duston (NSAC Department of Plant and Animal Science)	18-May-11	Title page only, Shubenacadie River Survey 2010: Temporal and spatial distribution of striped bass early life stages	KMKNO	
Catch Report Dec 2011 Duston	Jim Duston (NSAC Department of Plant and Animal Science)	30-Dec-11	Catch Report for license # 325881 and 330517	KMKNO	
Reesor Thesis Temporal Distribution Morone ... (Title Page)	Craig Reesor (Dalhousie University)	Jul-12	Temporal Distribution of Morone Saxatilis Eggs and Larvae and Neomysis Americana in the Shubenacadie Estuary. TITLE PAGE ONLY	KMKNO	
MacInnis Thesis Spatio-Temporal Distribution of Eggs (Title Page)	Gina MacInnis (Dalhousie University)	December, 2012	Spatio-Temporal Distribution of Eggs and Age-0 Striped Bass (Morone Saxatilis) in the Shubenacadie River Estuary. TITLE PAGE ONLY	KMKNO	
Shubenacadie River Monitoring 2012 season 2008-12 Review (Title Page)	Gina MacInnis & Jim Duston (Dalhousie University)	7-Mar-13	TITLE PAGE ONLY	KMKNO	
Catch Report March 2013 Duston	Jim Duston (NSAC Department of Plant and Animal Science)	25-Mar-13	Details of catch record of License #325881 and scientific activities associated with the specimen caught in May to Nov 2012	KMKNO	
Catch Report Jan 2014 Duston	Jim Duston (NSAC Department of Plant and Animal Science)	9-Jan-14	Details of catch record of License #325881 and scientific activities associated with the specimen caught in May to Nov 2013	KMKNO	
Shubenacadie River monitoring 2013 (Title Page)	Jim Duston (Dalhousie)	12-Feb-14	TITLE PAGE ONLY	KMKNO	
Shubenacadie River Monitoring: Report on 2011	G. Stewart J.Duston (Dalhousie)	Received June 2, 2011	TITLE PAGE ONLY	KMKNO	

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Name	Author/Publisher	Date	Description	Source	Assignment
DFO Recommendations to David Birkett	Mark McLean (DFO)	1-Aug-14	DFO review of Alton Natural Gas Estuary Monitoring Plan. (Full document) Review of monitoring programs. Recommends completing a study to determine median toxicity threshold of brine water and its constituents on Striped Bass eggs, larvae and juveniles. Includes description of monitoring summary of data collected and a draft design of the facility.	KMKNO	
May 2014 Data Collection & Monitoring Email & Documents	DFO/AtlaGas Ltd./Thaumas	Various, Late 2014	Communications between Bob Rutherford of Thaumas Environmental Consultants for Alton and Leanda Delaney of DFO in reference to a correction on dates for Juvenile bass migration. Includes Alton Natural Gas Estuary Monitoring Plan.	KMKNO	
Catch Report Nov 2014 Duston	Jim Duston (NSAC Department of Plant and Animal Science)	26-Nov-14	Details of catch record of License #325881 and scientific activities associated with the specimen caught in 2014	KMKNO	
		Full Documents		KMKNO	
2008 Alton Report FINAL March 2009	J.Duston and C.Reesor (NSAC Department of Plant and Animal Science)	25-Mar-09	Shubenacadie River Survey 2008: Striped bass and other fish and invertebrates. Discusses bass egg quantities as well as mysid shrimp due to their relation to salinity.	KMKNO	
2009 Alton Report FINAL. Dec 15. 2009	C.Reesor and J.Duston (NSAC Department of Plant and Animal Science)	11-Dec-09	Striped bass and Mysid abundance at the Alton diversion site, a summary report. Paper compares 2008 and 2009 striped bass egg, larvae, and juvenile populations and notes that there were more eggs in 09 but fewer larvae and juveniles due to higher rainfall, and interactions with tide heights and water temperature.	KMKNO	
Alton Gas Hydrogeology Program Summary Nov 27 2014	(for AtlaGas Ltd.)	28-Nov-14	Summary of Groundwater Monitoring program up to November 2014. Includes Domestic Well Survey (Jacques Whitford), Baseline Groundwater Monitoring Program (Stantec) with specific, individual well details.	KMKNO	
Alton Gas Project Biological Impact Statement	Thaumas Environmental Consultants Ltd.	16-Nov-07	Response to biological questions brought up during public and regulatory review of Jacques Whitford written Environmental Registration. Includes design of mixing channel, water intake, outfall, as well as a list of major species anticipated to affect the project.	KMKNO	
Alton Gas Application for Approval to Operate Brine Storage Facility Sept 2104	Marina Ritchie (WSP)	26-Sep-14	Application and Full Environmental Management Plan detailing operation and design of Alton Gas Brine Storage Facility.	KMKNO	
Alton Report: 2014 February 20 FINAL	Jim Duston (NSAC Department of Plant and Animal Science)	17-Feb-15	Shubenacadie River Monitoring 2014, Details of 2014 Striped Bass spawning as well as salinity trends and various other changes within the river.	KMKNO	
Catch Report Dec 2011 Duston	Jim Duston (NSAC Department of Plant and Animal Science)	30-Dec-11	Details of catch record of License #325881 and scientific activities associated with the specimen caught in 2011	KMKNO	
Catch Report Jan 2011 Duston	Jim Duston (NSAC Department of Plant and Animal Science)	21-Jan-11	Catch report for License #325881 sampling from May 13 to September 27 2010 on the Shuble River. Striped Bass, plankton, flounder, eiders, tom cod, gaspereau	KMKNO	
Catch Report Jan 2014 Duston	Jim Duston (NSAC Department of Plant and Animal Science)	9-Jan-14	Details of catch record of License #325881 and scientific activities associated with the specimen caught in 2013	KMKNO	
Catch Report March 2013 Duston	Jim Duston (NSAC Department of Plant and Animal Science)	25-Mar-13	Details of catch record of License #325881 and scientific activities associated with the specimen caught in May to Nov 2012	KMKNO	

Name	Author/Publisher	Date	Description	Source	Assignment
Catch Report Nov 2014 - Duston	Jim Duston (NSAC Department of Plant and Animal Science)	26-Nov-14	Details of catch record of License #925881 and scientific activities associated with the specimen caught in 2014	KMKNO	
DFO Catch Report 2008-451	DFO	2008	Catch numbers from Jim Duston to the DFO for May 16 to Nov 13 2008 Striped bass eggs, larvae, found as well as other species caught	KMKNO	
DFO Catch Report Sect 5 2 year 2009	DFO	2009	Catch numbers from Jim Duston to the DFO for 2009 Striped bass young as well as other species caught	KMKNO	
Macinnis Thesis Spatio-Temporal Distribution of Eggs and Age-0 Striped Bass Dec 2012	Gina Macinnis (Dalhousie University)	December, 2012	Master's Thesis Striped Bass Study in Shubenacadie Estuary from May to September 2010 and 2011. Studies effects of salinity and water temp.	KMKNO	
Reesor Thesis Temporal Distribution of Morone Saxatilis Eggs and Larvae July 2012	Craig Reesor (Dalhousie University)	Jul-12	Master's Thesis which directly references the Alton Brine Discharge and its effects on mysids and striped Bass eggs, larvae, and young in the Shubie-Stewiacke River. Includes results of analysis from salt cores, discussion of intake pipes effects, and brine composition	KMKNO	
Shubenacadie River Monitoring 2013	Jim Duston (NSAC Department of Plant and Animal Science)	24-Feb-14	2013 study of Shubie-Stewiacke river, focus on striped bass	KMKNO	
Shubenacadie River Monitoring Report 2011 Season	Jim Duston (NSAC Department of Plant and Animal Science)	17-Feb-12	2011 Study of Shubie-Stewiacke river, striped bass spawning and rainfall effects	KMKNO	
Shubenacadie River Monitoring 2012 season, 2008-12 review	Jim Duston (NSAC Department of Plant and Animal Science)	17-Mar-13	2012 Study of Shubie-Stewiacke river, includes review of 2008-20012 period	KMKNO	
Shubenacadie River Survey 2010	Jim Duston & G. Stewart (NSAC Department of Plant and Animal Science)	18-May-11	2010 Study of Shubie-Stewiacke river, focus on striped bass	KMKNO	
Environmental Registration for the Proposed Alton Natural Gas Storage Project (EA 2007)	Jacques Whitford	Jun-07	Full EA document as found on NSE website	NSE	
Supplemental Information for the Proposed Alton Natural Gas Storage Project (EA 2007)	Jacques Whitford	23-Nov-07	Supplemental Information to the EA as requested by the minister, attempts to address ministers questions about: First Nation communications and Fish issues; Water Intake, Brine Discharge, Sedimentation	NSE	
Alton Natural Gas Pipeline Assessment Registration	Stantec	Jul-12	EA document prepared with regard to the development of the Natural Gas pipelines, includes assessments of VECs such as Fish and Fish Habitats, rare vascular plants, wetlands, wildlife and wildlife habitats, groundwater resources, land and resource use, and archaeological and heritage resources.	NSE	
Z341 SERIES-14, Storage of hydrocarbons in underground formations and Z341.4-14, Salt cavern waste disposal	CSA	2014	CSA standards for storing hydrocarbons in underground formations	CSA	
Additional Documentation Reviewed					



Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

87  
July 28, 2015

Action ID No.:  
Action Date:  
Document Date:

Correspondence - Do not go to Macro Access Screen

Activity:

To

From:

Description:

**From:** Bird, Michael W [mailto:Michael.Bird@novascotia.ca]

**Sent:** 2015-July-28 9:52 AM

**To:** MacPhail, Helen; Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Weseloh McKean, Sean; Dera, Beata E; Skinner, Bradley; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; Jacobi, Carol; McLean, Mark G; Fairbairn, Heather J; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; Denis, Alex X

**Cc:** Wright, Patricia E; Yeh, Helen X; Sanford, Steve L

**Subject:** Alton Natural Gas Storage Technical Briefing

Good morning all,

Alton Natural Gas Storage has offered to provide a technical briefing to government on their initial views of the Conestoga-Rovers and Associates report completed for the KMK. David Birkett and Gina MacInnis will be providing the briefing, along with Tim Curch, VP of Stakeholder Relations with AltaGas Ltd. This will be held from 1:00 - 2:30 tomorrow, Wednesday, July 29th in Halifax. Please let me know if you, or anyone else from your organization would like to attend and I will add you to the appointment and let the Commissionaire know to expect you. Space is a little limited, but I will arrange things as best I can. I will be happy to share any materials we are provided with anyone who can't make it on this short notice.

Please let me know by the end of the day if you would like to attend.

Thanks,

Michael

Michael Bird, P.Eng.  
Petroleum Operations Engineer  
Nova Scotia Department of Energy

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

(902) 424-1945  
Michael.Bird@novascotia.ca <mailto:Michael.Bird@novascotia.ca>

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:  
0.00

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

91  
August 17, 2015

Activity: Correspondence - Do not go to Macro Access Screen  
To: Bradford, Rod  
From: McLean, Mark  
Description: Action ID No.:  
Action Date:  
Document Date:

**From:** McLean, Mark G  
**Sent:** 2015-August-14 3:33 PM  
**To:** Bradford, Rod  
**Cc:** MacNeil, Jack; Curran, Kristian  
**Subject:** FW: Alton's CRA response presentation

Rod:

FYI - Gina sent me this prior to the direction from DFO. I haven't read through it in detail but the method to determine the start of the period seems to align but they seem to have settled on two weeks without much justification. Hopefully the data will provide a better idea of the spawning window.

Mark

**From:** Gina MacInnis  
**Sent:** August 13, 2015 10:17 AM  
**To:** McLean, Mark G  
**Subject:** Re: Alton's CRA response presentation

Hello Mark,

Happy to hear there are internal discussion going on. Attached is a draft document that we have been putting together in an effort to define the protocol for shut down and re-start around the striped bass spawning season. Please feel free to call me at [REDACTED] to discuss. We would like to avoid picking a number/m3 as "peak spawning" as we recognize that over the life of the Alton project we may see large fluctuations in the adult striped bass population, and thus the egg numbers in front of the Alton site. Alternatively, a precautionary approach to avoiding brining through striped bass spawning seems more appropriate.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

David Birkett and I are meeting with Brad Skinner, David Blair and Steve Sanford tomorrow at the Truro NSE office at 10am to discuss how Alton is working on the CRA report recommendations and review out-standing EA conditions, brine discharge regulations etc. I know it is very last minute but if you happen to be able to join us or even call in for the meeting we would welcome your input.

Once science has had a chance to review Alton's proposal/ask for any additional information they require we are happy to come to meet and discuss.

Thank you,

Gina

On Wed, Aug 12, 2015 at 1:23 PM, McLean, Mark G <Mark.McLean@dfo-mpo.gc.ca>  
<mailto:Mark.McLean@dfo-mpo.gc.ca> wrote:  
Gina:

I met with Science and discussed the peak spawning question and we'll be looking for Alton to present some of the existing data to help define when the shutdown period would be. I'll send you details by the end of the week but if you'd like to discuss in advance please call me at (902) 802-0740  
<tel:%28902%29%20802-0740>. Thanks.

Mark

From: Gina MacInnis  
Sent: July 30, 2015 1:51 PM  
To: McLean, Mark G  
Subject: Alton's CRA response presentation

Title: PATH File No:	Shubenacadie River - water withdrawal and effluent release and natural gas storage 06-HMAR-MA7-00182	Habitat File No: 06-W7-182	Receive Date: 2006/08/11
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Hello Mark,

Attached is the presentation that was delivered at yesterday's meeting. We are working on a larger response document and will welcome feedback on several sections including "defining" the end of the striped bass spawning period.

We hope to have a draft of the document together the week of August 10th.

Thank you,

Gina

Action:	Information Provided	Effective Date:
		Expiry Date - HADD/Serious Harm:
		Expiry Date - Other :
		Compensation/Offsetting:
		Included in List of Records:
		Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Directory:

File Name:

Document Type (Upload):

Draft\_Spawning Events when Brine Discharge Will Be Other

File Extension: docx  
File Size: 3,266,747

**-DRAFT-**

## **Definition and Determination of Peak Spawning Events During Which Brine Discharge Will Be Curtailed**

### **CRA Recommendation:**

*"Recommend that the proposed monitoring plan clearly define "peak spawning events" for discontinuing brine discharge and include a contingency to reduce lag times between sampling and analysis of eggs in the river." (CRA report, section 4, page 13)*

### **Action:**

Through the river monitoring process Alton became aware of the significant number of striped bass eggs passing by the site during spawning. Although not required, Alton decided to commit to a precautionary approach and significantly reduce or stop introducing brine into the channel and total water withdraw when stripe bass spawning events take place.

Researchers at Dalhousie University have been classifying "peak spawning" on the Shubenacadie-Stewiacke river as spawning events were over 1000 egg/m<sup>3</sup> are detected. However, the adult striped bass population is at a record high and to anticipate that the very large number of eggs detected will remain extremely high for the foreseeable future would be naïve. Therefore, a more precautionary approach will be implemented were brining and water withdrawal is stopped or significantly reduce during stripe bass spawning events.

Eight years (2008-2015) of monitoring striped bass eggs through plankton net tows, revealed the initial large spawning event takes place after May 15, and is strongly associated with the Shubenacadie-Stewiacke estuary water temperature warming above 12°C. There is less than 1°C difference in water temperature between the Alton site and the spawning grounds (Fig. 1).

Starting on May 1 of each year water temperature will be monitored continuously and degree days above 12°C calculated. Degree days is a measure of how much warming (in degrees) and for how long (in days) the water temperature is above a certain level. In 5 of 7 years (2015 data not available yet), the initial big spawning event occurred when the estuary warmed between 11 and 18 degree days (°D) above 12°C (Table 1).

Weather forecasts will also be closely monitored in anticipation of spawning events. After May 15 of each year if the water temperature is above 12°C Alton will start reducing its maximum daily brining rate or stopped in anticipation of a large spawning event. Once the decision is made to stop discharging brine, the shutdown of the brine outfall can occurs within a few minutes.

In addition to monitoring of water temperatures and weather forecasts,

Known striped bass spawning locations will also be closely visually monitored for indication of spawning events.

Plankton net tows will be conducted at the Alton site to detect the presence of striped bass eggs. Beginning May 10 daily plankton net sampling will occur every ten minutes through the 90 minute flood tide. Flood tide sampling is an efficient means of capturing organisms suspended in the water column that have come downstream over the previous eleven hour ebb tide. The striped bass spawning season typically consisted of two to four large episodes where over 100 eggs/m<sup>3</sup> are detected, with several smaller events <10 eggs/m<sup>3</sup>, occurring over a two to three week period (Fig. 2).

Annual facilities maintenance will be scheduled to start the week of May 19<sup>th</sup>, which typically last two weeks, however brining can be halted earlier if water temperatures indicate a spawning event is imminent.

Variability through the spawning season and adaptive management for determining when to re-start the water withdrawal and brine discharge;

Each year following the first big spawn, newly fertilized eggs were detected almost daily if the estuary remained >14°C, different cohorts were mixed together by the ebb and flow of the tide. The 2012 spawning season was compressed between May 17 and June 5, associated with warm dry weather kept the estuary stable at 16-18°C (Figure 2). By contrast, a cessation of spawning was associated with the estuary cooling from >16°C to 11°C in both 2010 (May 25 to June 2) and 2011 (June 10 to 16; Fig. 2).

The predictability of the first spawning event is fairly dependable and shut down will be tailored around that. However, given the variability in the length of the spawning season, eggs >10/m<sup>3</sup> were detected for 12 and 31 days from 2008 to 2014, adaptive management will be an essential part of re-start.

Following the two consistent weeks of shut down the progression of the spawning season will be assessed, taking into consideration how many spawning episodes have taken place, the size of the spawning's and the water temperature variability through the season. If several spawning episodes take place within a two week, warm and dry period, re-start may be initiated. However daily plankton net tows, water temperature and visual up-stream monitoring will take place for the subsequent two weeks. If an additional large spawning episode is detected brining level will be reduced or discontinued once again.

Keeping in mind that when very low numbers of striped bass eggs are present in the estuary the possibility of entrapment is near zero. The Biological Impact Statement, within Alton's

supplemental EA (Appendix C), estimated “*Out of 100 drifting eggs and larvae, based on water flow, 86 will pass in the river, and 14 will enter the mixing channel and potentially 0.01 to 0.15 will enter the intake. The faster flow and turbulence pattern at right angles to the intake will reduce the potential entrapment of eggs and larvae to near zero.*” (Jacques Whitford. 2007b).

Considering the presence of striped bass larvae near the Alton site;

The density of striped bass larvae at the Alton Site was much lower than eggs, and varied considerably between years. Most notably, in 2009 a total of only 458 larvae were collected at the Alton Site during the ebb tide and mean daily density  $<1/\text{m}^3$ , 0.03% of the number of eggs counted (Figure 2). By contrast, in 2012, the mean daily density of larvae was  $>1000/\text{m}^3$  for several days in late-May, 6.25% of the number of eggs caught (Figure 2). The presence of larvae at the Alton Site was largely dependent on salinity; they were absent if the ebb tide water was fresh, and their concentration highest at 1 to 4 ppt salinity. By early July, striped bass were rarely caught in plankton net tows in the main channel, associated with their transition from larvae to juvenile and migration to the margins.

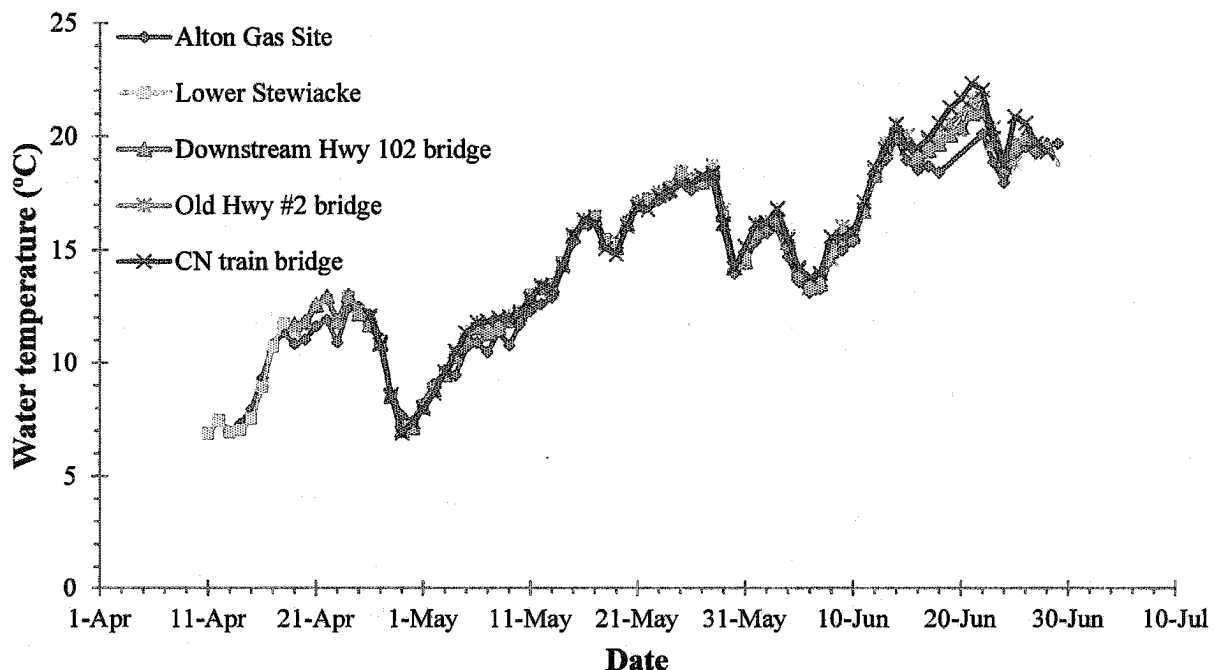


Figure 1. Daily mean water temperature (°C) from April 11 to June 29, 2012 collected from five conductivity-temperature-depth loggers on the Shubenacadie and Stewiacke Rivers. Loggers were positioned at the Alton Gas Site (river km 25 Shubenacadie), Lower Stewiacke River (rkm 0.7 Stewiacke), downstream of the Highway 102 Bridge (rkm 2 Stewiacke), old highway #2 bridge (rkm 4 Stewiacke) and the Canadian National train bridge (rkm 8.7 Stewiacke).



Table 1. Striped bass initial large spawning episode over seven years in the Stewiacke River as judged by egg collections down-estuary on the Shubenacadie River (rkm 25) relative to degree days ( $^{\circ}\text{D}$ ) accumulated above  $12^{\circ}\text{C}$  and duration of warming trend

Year	Initial big spawn	Degree days $>12^{\circ}\text{C}$	Duration warming trend (days)	Mean temperature at spawning ( $^{\circ}\text{C}$ )
2008	01-Jun	11.3	5	12.8
2009	24-May	13	3	16.1
2010	16-May	16.2	12	12.3
2011	22-May	5.6	4	12.2
2012	17-May	19	7	16.5
2013	26-May	5.5	6	14.5
2014	20-May	17.2	6	14.6

Figure 2. Daily mean density per cubic meter of water filtered of striped bass eggs (black circles) and larvae (grey circles) over seven years in the Shubenacadie River estuary at the Alton Site (rkm 25). Each coordinate is a mean of between 3 and 10 plankton net tows in the main channel over several hours through the ebb tide. Daily mean water temperature (solid line) and daily rainfall (grey bars) are also shown.

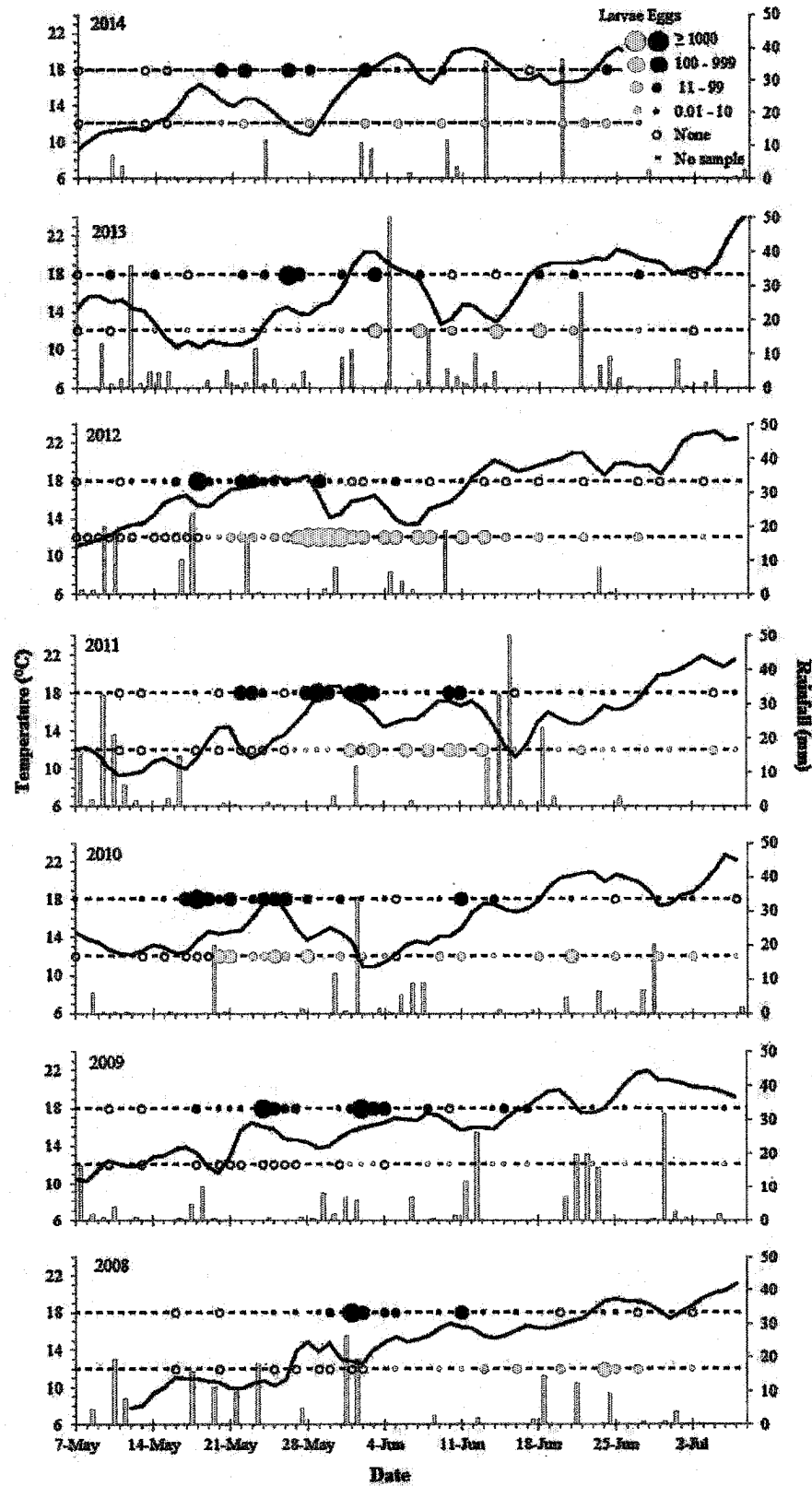


Figure 2. (see description above).

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

90  
August 17, 2015

Action ID No.:  
Action Date:  
Document Date:

Correspondence - Do not go to Macro Access Screen

To  
Birkett, David  
McLean, Mark

Description:

**From:** McLean, Mark G  
**Sent:** 2015-August-14 3:04 PM  
**To:** Gina MacInnis  
**Cc:** Hominick, Craig; MacNeil, Jack  
**Subject:** Striped Bass Spawning

Gina:

As discussed I met with DFO Science this week and we are able to provide some direction on analyses that could be pursued to help guide the determination of when Alton might suspend brining operations based on Striped Bass spawning. Two types of analyses were suggested: 1) exploration of water temperature at the onset of spawning; and 2) exploration of egg density during the spawning period.

First, as discussed at our last meeting, water temperature is known to be an indicator of the onset of the spawning period. To explore this further, Alton could analyse historical data to see if any relationship exists between water temperature and the onset of spawning (e.g. x-y plot of temperature at onset of spawning versus time). In addition, a box-and-whisker plot of water temperature versus egg density/abundance could be used to determine if any relationship exists between the two variables. Although water temperature is an indicator of the onset of spawning, Alton should also propose how they will confirm spawning has commenced once a "threshold" temperature has been reached. With this in mind, additional analyses should be presented evaluating potential "false starts" to the spawning period, including some thought of how Alton might distinguish between such events from start of the main spawning period.

Second, in order to evaluate the general nature of spawning over the spawning period, DFO is recommending exploration of historical egg density data versus time, in order to provide insight into any potential "window" of spawning. Analyses/figures that could be pursued/explored pending data availability include: 1) cumulative egg density curves plotted by year-day, with temperature at onset of spawning associated with each curve (curves would demonstrate variability between years); and 2) average normalized cumulative egg density plot versus time (benchmarked to Day 0 that marks the onset of spawning), including confidence intervals or standard deviations around the average normalized distribution (this analysis could be

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

supplemented by a figure outlining the average rate of change in egg density versus time, to see if there is a general period of heightened egg productivity that follows the onset of spawning).

The report should identify all assumptions in the data and/or limitations in the analyses (e.g. sources of uncertainty). If you have any questions you can contact Rod Bradford directly or contact Jack MacNeil or Craig Hominick at(902) 802-6134.

Mark McLean  
Manager, Regulatory Reviews | Gestionnaire, examens réglementaires  
Fisheries Protection Program | Programme de protection des pêches  
Telephone | Téléphone 902-802-0740  
Facsimile | Télécopieur 902-426-1489  
[Mark.McLean@dfp-mpo.gc.ca](mailto:Mark.McLean@dfp-mpo.gc.ca) <<mailto:Mark.McLean@dfp-mpo.gc.ca>>  
Fisheries and Oceans Canada | Pêches et Océans Canada  
PO Box 1006, Dartmouth, NS B2Y 4A2  
CP 1006, Dartmouth, N-É B2Y 4A2  
Government of Canada | Gouvernement du Canada

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Action: Request for additional Information

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

93

August 24, 2015

Action ID No.:

Action Date:

Document Date:

Correspondence - Do not go to Macro Access Screen

To: Bradford, Rod

From: MacNeil, Jack

Description:

**From:** MacNeil, Jack  
**Sent:** 2015-August-24 2:32 PM  
**To:** Bradford, Rod  
**Cc:** Hominick, Craig; McLean, Mark G  
**Subject:** Spawning Period - Alton Gas

Hi Rod

Based on the two emails attached (from Gina and Craig) the document attached is going to require a formal SSR.

I will start the process to limit any time delay because of leave.

Thanks

Jack

Jack MacNeil  
Fisheries Protection Program  
Fisheries and Oceans Canada  
Dartmouth, N.S.  
( c ) 902-401-3934

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

Action:	Information Provided	Effective Date:
		Expiry Date - HADD/Serious Harm:
		Expiry Date - Other :
		Compensation/Offsetting:
		Included in List of Records:
		Species at Risk:

0.00

Time Spent (Hrs):  
Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Action ID No.: 92  
August 24, 2015

Activity: Correspondence - Do not go to Macro Access Screen  
To: MacNeil, Jack  
From: MacNeil, Jack  
Description: Action Date:  
Document Date:

**From:** MacNeil, Jack  
**Sent:** 2015-August-24 1:42 PM  
**To:** 'Gina MacInnis'  
**Subject:** RE: Striped Bass Spawning

Hi Gina

At DFO there is a formal process where different sectors within DFO make a request for the Science Branch to review and provide comment on a topic.

Regarding the document you submitted to Rod, is it still in draft phase or would you like it to be considered a final copy and we here at FPP can make a request to science to review and comment.

Thanks

Jack

**From:** Gina MacInnis  
**Sent:** 2015-August-20 5:00 PM  
**To:** McLean, Mark G; Bradford, Rod  
**Cc:** Hominick, Craig; MacNeil, Jack  
**Subject:** Re: Striped Bass Spawning

Hello all,

Attached is a document we have put together with 2008-2015 striped bass spawning data collected during the Alton monitoring program. Based on the data, we have outlined a proposal on how to establish when brining will be suspended during the spawning season.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
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Receive Date: 2006/08/11

s.19(1)

If you have questions about the document or would like me to include further analysis please feel free to contact me through e-mail or at [REDACTED]

Looking forward to your feedback.

Thank you,

Gina

On Fri, Aug 14, 2015 at 3:03 PM, McLean, Mark G <Mark.McLean@dfo-mpo.gc.ca>  
<mailto:Mark.McLean@dfo-mpo.gc.ca> wrote:  
Gina:

As discussed I met with DFO Science this week and we are able to provide some direction on analyses that could be pursued to help guide the determination of when Alton might suspend brining operations based on Striped Bass spawning. Two types of analyses were suggested: 1) exploration of water temperature at the onset of spawning; and 2) exploration of egg density during the spawning period.

First, as discussed at our last meeting, water temperature is known to be an indicator of the onset of the spawning period. To explore this further, Alton could analyse historical data to see if any relationship exists between water temperature and the onset of spawning (e.g. x-y plot of temperature at onset of spawning versus time). In addition, a box-and-whisker plot of water temperature versus egg density/abundance could be used to determine if any relationship exists between the two variables. Although water temperature is an indicator of the onset of spawning, Alton should also propose how they will confirm spawning has commenced once a "threshold" temperature has been reached. With this in mind, additional analyses should be presented evaluating potential "false starts" to the spawning period, including some thought of how Alton might distinguish between such events from start of the main spawning period.

Second, in order to evaluate the general nature of spawning over the spawning period, DFO is



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recommending exploration of historical egg density data versus time, in order to provide insight into any potential "window" of spawning. Analyses/figures that could be pursued/explored pending data availability include: 1) cumulative egg density curves plotted by year-day, with temperature at onset of spawning associated with each curve (curves would demonstrate variability between years); and 2) average normalized cumulative egg density plot versus time (benchmark to Day 0 that marks the onset of spawning), including confidence intervals or standard deviations around the average normalized distribution (this analysis could be supplemented by a figure outlining the average rate of change in egg density versus time, to see if there is a general period of heightened egg productivity that follows the onset of spawning).

The report should identify all assumptions in the data and/or limitations in the analyses (e.g. sources of uncertainty). If you have any questions you can contact Rod Bradford directly or contact Jack MacNeil or Craig Hominick at (902) 802-6134 <tel:%28902%29%20802-6134>.

Mark McLean  
Manager, Regulatory Reviews | Gestionnaire, examens réglementaires  
Fisheries Protection Program | Programme de protection des pêches  
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Mark.McLean@dfo-mpo.gc.ca <mailto:Mark.McLean@dfo-mpo.gc.ca>  
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CP 1006, Dartmouth, N-É B2Y 4A2  
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PATH File No: 06-HMAR-MA7-00182  
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Receive Date: 2006/08/11

Action:

Request for additional Information

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Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:  
0.00

Title: PATH File No:	Shubenacadie River - water withdrawal and effluent release and natural gas storage 06-HMAR-MA7-00182	Habitat File No: 06-W7-182	Receive Date: 2006/08/11
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Activity:	Correspondence - Do not go to Macro Access Screen	Action ID No.: 94
To:	MacNeil, Jack	Action Date: September 25, 2015
From:	MacPhail, Helen	Document Date: September 30, 2015

Description:

**From:** MacPhail, Helen [mailto:Helen.MacPhail@novascotia.ca]  
**Sent:** 2015-September-25 11:35 AM  
**To:** Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Weseloh McKeane, Sean; Dera, Beata E; Skinner, Bradley; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; Jacobi, Carol; McLean, Mark G; Bird, Michael W; Fairbairn, Heather J; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; Denis, Alex X; Sanford, Steve L  
**Cc:** Wright, Patricia E; Yeh, Helen X  
**Subject:** Alton Gas Meeting - Sept 30

Hello All,

This email is just to confirm that we will be having a meeting next Wednesday, September 30th, from 1.00pm till 3.00 pm in Boardroom 18 C Barrington Tower.

I have attached an agenda and the meeting notes with action items from the last meeting. I've also attached a CONFIDENTIAL DRAFT copy of the Industrial Approval for the Operation of the Brine Storage Pond for your review and comment.

Here again is the link for provincial folks to the shared drive: I:\Policy\Alton Gov Group.

Look forward to seeing you next week.

Helen MacPhail

Environmental Assessment Supervisor  
**Environmental Assessment Branch**

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Nova Scotia Environment  
1903 Barrington Street  
Suite 2085  
PO Box 442  
Halifax, NS B3J 2P8  
Tel 424-3960  
Fax: 424-6925

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Directory:

File Name:

Document Type (Upload):

May 27, 2015  
OtherFile Extension:  
File Size: docx  
16,303

Directory:

File Name:

Document Type (Upload):

Alton Draft IA for govt circulation  
OtherFile Extension:  
File Size: docx  
151,197

Directory:

File Name:

Document Type (Upload):

Agenda September 30, 2015  
OtherFile Extension:  
File Size: docx  
14,367

## **Meeting Notes – Alton May 27, 2015**

Present: Jack MacNeil, Kevin Bekkers, Jay Brenton, Michael Bird, Lee Anne Crouse, Jordan , Dave Mackinnon, Sam Hines, Heather Potter, Alex Denis

### **NSE, EA Branch- Helen MacPhail**

NSE still waiting for help from Bruce Langille with security for gas pipeline in Protected Water Area.

Preparing responses to Sipek' letters of April 21 and 23. Will be sending out to gov. group for input and review.

Minister granted 2 yr. commencement of work till May 21, 2017.

Alton have indicated they intend to carry out field work on the small re-alignment. They have been advised that communication with the Mi'kmaq and public is crucial.

*Action - Helen M. will report back on word from Bruce Langille re: security for the gas pipeline.*

*Preparing responses to Sipek' and may be looking for additional input and will share drafts with gov. group.*

*Will circulate latest updates and link to shared drive.*

*Will contact Alton to ask for the details of the field work they are proposing for the small re-alignment along with details of any permits or approvals. Done*

### **NSE Regional Office – Jay Brenton**

Draft Industrial Approval for Operation of the Brine Storage Pond will be shared with gov. group shortly. Recognize that revisions may be needed in response to KMK's independent review. Still waiting for additional information from the company re: NORMs.

*Action – Draft IA to be shared with gov. group.*

*To confirm if any further NSE Industrial Approvals are required, particularly with respect to the compressor.*

*Inspector to visit site on June 3 to review 30 m setback from wetlands and watercourses.*

### **DFO – Jack MacNeil**

Nothing new to report.

### **OAA – Heather Potter**

Reported that there are weekly updates with OAA from the KMK. OAA has a copy of the independent review work plan. A draft of the KMK's independent review is expected June 26 with the final due on July 10.

**NSE, Protected Areas – Dave MacKinnon**

Reported that he is trying to contact Northern Pulp to discuss the possible land swap.

**DNR – Sam Hines**

On May 19, 2015 the application was received for the Crown Land Lease which has been sent for an internal review. This review is anticipated to take 3-4 weeks.

*Action: DNR working on the letter of authority for the Crown Land Lease .*

*DNR working on the easement template for the gas pipeline*

**NS Agriculture – Kevin Bekkers**

Goal is to have river access agreement in place by June 15, 2015, pending consultation with Mi'kmaq.

Provided some background as to how the dyke was breached and where things go from here.

**CCH- Sean Weseloh McKeane**

Alton will need an archeological permit for the gas pipeline project (including field work re: re-alignment), which they have not yet applied for.

**NS Energy – Michael Bird**

Alton will need to apply to the UARB for approval to build and operate pipeline and caverns. Consultation rests with Dept. of Energy for this piece.

There was discussion about the need for a compressor for the project.



36 Inglis Place  
Truro, Nova Scotia  
Canada B2N 4B4

902 893-5880 T  
902 893-0282 F  
www.gov.ns.ca

Our File Number: 92100-30-TRU-2008-061384-A03

WSP Canada Inc.  
c/o Ms. Marina Ritchie  
1 Spectacle Lake Drive  
Dartmouth, NS  
B3B 1X7

Dear Ms. Ritchie:

**RE: Approval to Operate - Brine Storage Pond**  
**Approval No. 2008-061384-A03**  
**PID # 20076386**

---

Enclosed please find Approval # 2008-061384-A03 issued to Alton Natural Gas Storage LP. to operate the Brine Storage Pond and associated works at Fort Ellis, Colchester County, Nova Scotia. Please ensure the original approval is forwarded to the approval holder.

Strict adherence to the attached terms and conditions is imperative in order to validate this approval.

Despite the issuance of this Approval, the Approval Holder is still responsible for obtaining any other authorization which may be required to carry out the activity, including those which may be necessary under provincial, federal or municipal law.

Should you have any questions, please contact Kelly D McNally, Northern Region, Truro Office at (902) 893-5880.

Yours truly,

Brad Skinner  
District Manager

cc David Birkett, Alton  
Eimas #: 2008-061384-A03



## APPROVAL

Province of Nova Scotia  
*Environment Act, S.N.S. 1994-95, c.1*

APPROVAL HOLDER: Alton Natural Gas Storage LP.

SITE PID: 20076386

APPROVAL NO: 2008-061384-A03

EXPIRY DATE: March 1, 2025

Draft

Pursuant to Part V of the *Environment Act, S.N.S. 1994-95, c.1* as amended from time to time, approval is granted to the Approval Holder subject to the Terms and Conditions attached to and forming part of this Approval, for the following activity:

Operation of a Brine Storage Pond, and associated works, at or near Fort Ellis, Colchester County in the Province of Nova Scotia.

Administrator \_\_\_\_\_  
Brad Skinner

Effective Date \_\_\_\_\_



## TERMS AND CONDITIONS OF APPROVAL

### Nova Scotia Environment

**Approval Holder:** Alton Natural Gas Storage LP.  
**Project:** Brine Storage Pond Operation  
**Site:** Fort Ellis, Colchester County  
PID # 20076386

**Approval No:** 2008-061384-A03

**File No:** 92100-30-TRU-2008-061384-A03

**Map Series:** 11E/03

**Grid Reference:** E469700 N5001050

#### Reference Documents:

- Application dated October 25, 2014 and attachments.
- Environmental Management Plan - Operation of Brine Storage Pond and Associated Facilities, Alton Natural Gas Storage LP., dated October 6, 2014, as prepared by WSP Canada Inc.
- Alton Natural Gas Estuary Monitoring Plan as submitted to DFO.
- Letter dated August 1, 2014 from Mark McLean of Fisheries and Oceans Canada to David Birkett of Alton Natural Gas Storage LP. regarding their review of the Estuary Monitoring Plan.

#### 1. Definitions

- a) "Act" means the *Environment Act* S.N.S. 1994-1995, c.1 and includes all regulations made pursuant to the Act.
- b) "Department" means the Northern Region, Truro Office, of Nova Scotia Environment located at the following address:  
Nova Scotia Environment  
Compliance Division  
Northern Region, Truro Office  
36 Inglis Place, 2<sup>nd</sup> Floor  
P.O. Box 824  
Truro, Nova Scotia B2N 4B4  
  
Phone: (902) 893-5880  
Fax: (902) 893-0282

- 2 -

- c) "Facility" means the Brine Storage Pond and associated works.
- d) "Minister" means the Minister of Nova Scotia Environment.

## **2. Scope of Approval**

- a) This Approval (the "Approval") relates to the Approval Holder and their application and supporting documentation, as listed in the reference documents above, to Operate the Facility, situated at or near Fort Ellis, Colchester County (the "Site").
- b) The Facility shall be operated as outlined in the application for industrial approval dated October 25, 2014 and supporting documentation.
- c) The Site shall not exceed the area as outlined in the application and supporting documentation.

## **3. General Terms and Conditions**

- a) The Approval Holder shall operate the Facility in accordance with provisions of the:
  - i) *Environment Act* S.N.S. 1994-1995, c.1, as amended from time to time;
  - ii) Regulations, as amended from time to time, pursuant to the above Act;
- b) The Approval Holder is responsible for ensuring that they construct the Facility on lands which they own or have a lease or written agreement with the landowner or occupier. The Approval Holder shall be responsible for ensuring that the Department has, at all times, a copy of the most recent lease or written agreement with the landowner or occupier. Breach of this condition may result in cancellation or suspension of the Approval.
- c) If there is a discrepancy between the reference documents and the terms and conditions of this Approval, the terms and conditions of this Approval shall apply.
- d) The Minister or Administrator may modify, amend or add conditions to this Approval at anytime pursuant to Section 58 of the Act.
- e) This Approval is not transferable without the consent of the Minister or Administrator.
- f) (i) If the Minister or Administrator determines that there has been non-compliance with any or all of the terms and conditions contained in this Approval, the Minister or Administrator may cancel or suspend the

- 3 -

Approval pursuant to subsections 58(A)(1) and 58(A)(2) of the Act, until such time as the Minister or Administrator is satisfied that all terms and conditions have been met.

- (ii) Despite a cancellation or suspension of this Approval, the Approval Holder remains subject to the penalty provisions of the Act and regulations.
- g) The Approval Holder shall notify the Department prior to any proposed extensions or modifications of the Facility, including the active area, process changes or waste disposal practices which are not granted under this Approval. An amendment to this Approval will be required before implementing any change. Extensions or modifications to the Facility may be subject to the Environmental Assessment Regulations.
- h) Pursuant to Section 60 of the *Act*, the Approval Holder shall submit to the Administrator any new and relevant information respecting any adverse effect that actually results, or may potentially result, from any activity to which the Approval relates and that comes to the attention of the Approval Holder after the issuance of the Approval.
- i) The Approval Holder shall immediately notify the Department of any incidents of non-compliance with this Approval.
- j) The Approval Holder shall bear all expenses incurred in carrying out the environmental monitoring required under the terms and conditions of this Approval.
- k) Unless specified otherwise in this Approval, all samples required to be collected by this Approval shall be collected, preserved and analysed, by qualified personnel, in accordance with recognized industry standards and procedures.
- l) Unless written approval is received otherwise from the Administrator, all samples required by this Approval shall be analysed by a laboratory that meets the requirements of the Department's "Policy on Acceptable Certification of Laboratories" as amended from time to time.
- m) The Approval Holder shall submit any monitoring results or reports required by this Approval to the Department. Unless specified otherwise in this Approval, All monitoring results shall be submitted within 30 days following the month of monitoring.

- 4 -

- n) The Approval Holder shall ensure that this Approval, or a copy, is kept on Site at all times and that personnel directly involved in the Facility operation are made fully aware of the terms and conditions which pertain to this Approval.
- o) Signage including emergency telephone numbers and contacts are to be posted at the entrance to the Facility.

#### **4. Facility Operation**

- a) The site shall be developed and maintained to prevent siltation of the surface water which is discharged from the property boundaries into the nearest watercourse or beyond the property boundary. Erosion and sedimentation controls are to be in place as required to ensure Site runoff does not exceed the discharge limits contained herein.
- b) No authority is granted by this Approval to enable the Approval Holder to discharge surface water beyond the property boundary and onto adjoining lands without the authorization of the affected landowner(s). The Approval Holder shall ensure that the following discharge limits are met for any water which is discharged from the Site to a watercourse or wetland:

##### **Clear Flows (Normal Background Conditions):**

- i) Maximum increase of 25 mg/l from background levels for any short term exposure (24 hours or less)
- ii) Maximum average increase of 5 mg/l from background levels for longer term exposure (inputs lasting between 24 hours and 30 days)

##### **High Flow (Spring Freshets and Storm Events)**

- i) Maximum increase of 25 mg/l from background levels at any time when background levels are between 25 mg/l and 250 mg/l
- ii) Shall not increase more than 10% over background levels when background is > 250 mg/l

##### **pH**

- i) Maximum 5 to 9 in grab sample
- ii) Maximum 6 to 9 as a Monthly Arithmetic Mean

##### **TPH**

- i)  $\leq 15$  mg/l

- c) The level of the brine in the brine retention pond and the flow of brine from the retention pond to the mixing channel shall be monitored continuously when brine is stored in, or released from, the retention pond.

- 5 -

- d) Water salinity and temperature monitoring shall be conducted using Conductivity, Depth, and Temperature (CDT's) arrays placed in the center of the mixing channel at 5 meters either side of the toe of the brine water outfall, within the mixing channel, as specified in the DFO accepted monitoring plan (bottom, 1.5m, 3.0m, 4.5m depths).
- e) Conductivity, Depth, and Temperature (CDT's) monitors shall be placed on the bottom of the mixing channel at each end of the channel.
- f) Data from the CDT's shall be recorded at 10 minute intervals and collected/down loaded daily for the first week brine is released into the mixing channel, then three times a week until full brining is achieved. The approval holder may reduce the frequency of data collection based on written consent from the Department.
- g) From April 15<sup>th</sup> until September 30<sup>th</sup> annually, when brine water is being released into the mixing channel, salinity levels at the outlet of the mixing channel shall be no more than 7 ppt (parts per thousand) above background levels (levels measured at the inlet of the mixing channel at the time of the reading).
- h) From October 1<sup>st</sup> until April 14<sup>th</sup> annually, when brine water is being released into the mixing channel, the one hour averages for salinity at the mixing channel outlet shall be maintained below 28 ppt with no single result exceeding 35 ppt.
- i) The Approval Holder shall immediately reduce the volume of brine water being discharged to the mixing channel if the salinity levels measured at the outlet of the mixing channel exceed the levels specified in this approval.
- j) The Approval Holder shall maintain an issue/complaint monitoring program as outlined in the Environmental Management Plan submitted with the application for approval. Reports from this program are to be included in the quarterly reports required in Section 10 of this approval.
- k) The Approval Holder shall maintain an Emergency Response and Contingency Plans as outlined in the Environmental Management Plan submitted with the application for approval.

## **5. Particulate Emissions (Dust)**

- a) Particulate emissions shall not exceed the following limits at or beyond the Site property boundaries:  
Annual Geometric Mean      70 µg/m<sup>3</sup>

- 6 -

Daily Average (24 hr.)  $120 \mu\text{g}/\text{m}^3$

- b) Monitoring of particulate emissions shall be conducted at the request of the Department. The location of the monitoring station(s) for particulate will be established by a qualified person retained by the Approval Holder and submitted to the Department for approval, this may include point(s) beyond the property boundary of the Site.
- c) When requested, suspended particulate matter and  $\text{PM}_{10}$  shall be measured by the EPA standard; EPA/625/R-96/010a, or equivalent acceptable to the Department.
- d) The use of used oil as a dust suppressant is strictly prohibited. The generation of dust from the Site shall be suppressed as required.

## **6. Sound Levels**

- a) Sound levels measured at the Site property boundaries shall not exceed the following equivalent sound levels (Leq):
  - Leq 65 dBA 0700-1900 hours (Days)
  - 60 dBA 1900-2300 hours (Evenings)
  - 55 dBA 2300-0700 hours (Nights)
- b) Monitoring of sound levels shall be conducted at the request of the Department. The location of the monitoring station(s) for sound will be established by a qualified person retained by the Approval Holder and submitted to the Department for approval, this may include point(s) beyond the property boundary of the Site.

## **7. Groundwater**

- a) The Approval Holder shall replace at their expense any water supply which has been lost or damaged as a result of extracting aggregate.
- b) A groundwater monitoring well shall be maintained immediately down-gradient of the brine storage pond. Baseline groundwater conditions shall be established before Facility operation commences. Groundwater shall be monitored for pH, conductivity, chloride concentration, and salinity.

## **8. Spills or Releases**

- a) All spills or releases shall be reported in accordance with the Act (Part VI) and the Emergency Spill Regulations.
- b) Spills or releases shall be cleaned up immediately in accordance with the

- 7 -

*Act.*

Draft

- 8 -

- c) A spill response and reporting plan shall be maintained by the Approval Holder as outlined in the Environmental Management Plan submitted with the application for approval. Reports from this program are to be included in the quarterly reports required in Section 10 of this approval.

## **9. Rehabilitation**

- a) The Approval Holder shall provide a rehabilitation plan acceptable to the Department at least 60 days before abandoning the site.

## **10. Site Specific Conditions**

- a) The Facility shall be constructed, maintained and operated as indicated in the plans prepared by WSP Canada Inc., dated November 22, 2013 and as stamped by R.W. Stephenson, P. Eng. on January 18, 2014.
- b) The Approval Holder shall sample the cavern brine water for Naturally Occurring Radioactive Materials periodically during the development of the caverns and submit the results to the Department.
- c) When solution mining is occurring, the Approval Holder shall prepare and submit to the Department quarterly reports, within 30 days following the quarter, which includes;
  - i) Maximum and minimum levels in the Brine Retention Pond, and
  - ii) Maximum levels recorded for each CDT monitor in the mixing channel, and all recorded levels which indicate an exceedance of the salinity limits established in this approval, with explanations and follow up actions for any exceedance, and
  - iii) Any complaints received during the quarter and follow up actions taken, and
  - iv) Any reportable spills and the actions taken to address the release.



## **Alton Meeting**

1.00pm– 3.00 pm Wednesday, September 30, 2015

Boardroom 18 C, Barrington Tower

1. Introductions
2. Draft Industrial Approval (Brad Skinner)
3. Round table updates (see meeting notes and action items from May 27, 2015)
4. Next meeting

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
 PATH File No: 06-HMAR-MA7-00182  
 Habitat File No: 06-W7-182

Receive Date: 2006/08/11

## Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.: 96

September 29, 2015

## To:

MacNeil, Jack

Action Date:

September 29, 2015

## From:

MacPhail, Helen

Document Date:

## Description:

**From:** MacPhail, Helen [mailto:Helen.MacPhail@novascotia.ca]

**Sent:** 2015-September-29 9:59 AM

**To:** Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Weseloh McKeane, Sean; Dera, Beata E; Skinner, Bradley; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; Jacobi, Carol; McLean, Mark G; Bird, Michael W; Fairbairn, Heather J; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; Denis, Alex X; Sanford, Steve L

**Cc:** Wright, Patricia E; Yeh, Helen X

**Subject:** RE: Alton Gas Meeting - Sept 30

Here is the re-alignment field-truthing information for your review and comment.

Helen

**From:** MacPhail, Helen

**Sent:** Tuesday, September 29, 2015 9:51 AM

**To:** Hines, Samantha E <Samantha.Hines@novascotia.ca <mailto:Samantha.Hines@novascotia.ca>>; Cameron, Melanie J <Melanie.Cameron@novascotia.ca <mailto:Melanie.Cameron@novascotia.ca>>; Bekkers, Kevin F <Kevin.Bekkers@novascotia.ca <mailto:Kevin.Bekkers@novascotia.ca>>; Weseloh McKeane, Sean <Sean.WeselohMcKeane@novascotia.ca

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<mailto:Jay.Brenton@novascotia.ca>>; Maass, Oliver C <Oliver.Maass@novascotia.ca

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<mailto:carol.Jacobi@dfo-mpo.gc.ca>>; 'mark.mclean@dfo-mpo.gc.ca' <mark.mclean@dfo-mpo.gc.ca

<mailto:mark.mclean@dfo-mpo.gc.ca>>; Bird, Michael W <Michael.Bird@novascotia.ca

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

2006/08/11  
Receive Date: à l'information.

<mailto:Michael.Bird@novascotia.ca>; Fairbairn, Heather J <Heather.Fairbairn@novascotia.ca>  
<mailto:Heather.Fairbairn@novascotia.ca>; 'MT. Grant@ec.gc.ca' <MT.Grant@ec.gc.ca>  
<mailto:MT.Grant@ec.gc.ca>; Robichaud, Loretta L <Loretta.Robichaud@novascotia.ca>  
<mailto:Loretta.Robichaud@novascotia.ca>; Devine, Lisa J <Lisa.Devine@novascotia.ca>  
<mailto:Lisa.Devine@novascotia.ca>; Crouse, Lee Ann G <LeeAnn.Crouse@novascotia.ca>  
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<mailto:Peter.Geddes@novascotia.ca>; Walker, Ernest <Ernest.Walker@novascotia.ca>  
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<mailto:Alex.Denis@novascotia.ca>; Sanford, Steve L <Steve.Sanford@novascotia.ca>  
<mailto:Steve.Sanford@novascotia.ca>

**Cc:** Wright, Patricia E <Patricia.Wright@novascotia.ca> <mailto:Patricia.Wright@novascotia.ca>; Yeh, Helen X <Helen.Yeh@novascotia.ca> <mailto:Helen.Yeh@novascotia.ca>

**Subject:** RE: Alton Gas Meeting - Sept 30

Hello All,

For your information and review, and to help with the discussion at tomorrow's meeting, I have attached updated follow-up documents for both the storage facility and pipeline EA conditions. In addition, I shall forward an email that I received yesterday regarding the field-truthing work carried-out by Alton on the slight re-alignment of the gas pipeline.

Regards,

*Helen MacPhail*

---

Environmental Assessment Supervisor

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

## Environmental Assessment Branch

Nova Scotia Environment  
1903 Barrington Street  
Suite 2085  
PO Box 442  
Halifax, NS B3J 2P8  
Tel 424-3960  
Fax: 424-6925

**From:** MacPhail, Helen

**Sent:** Friday, September 25, 2015 11:35 AM

**To:** Hines, Samantha E <Samantha.Hines@novascotia.ca <mailto:Samantha.Hines@novascotia.ca>>; Cameron, Melanie J <Melanie.Cameron@novascotia.ca <mailto:Melanie.Cameron@novascotia.ca>>; Bekkers, Kevin F <Kevin.Bekkers@novascotia.ca <mailto:Kevin.Bekkers@novascotia.ca>>; Weseloh McKeane, Sean <Sean.WeselohMcKeane@novascotia.ca

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<mailto:Loretta.Robichaud@novascotia.ca>>; Devine, Lisa J <Lisa.Devine@novascotia.ca

<mailto:Lisa.Devine@novascotia.ca>>; Crouse, Lee Ann G <LeeAnn.Crouse@novascotia.ca

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

<mailto:LeeAnn.Crouse@novascotia.ca>; Geddes, Peter <Peter.Geddes@novascotia.ca>  
<mailto:Peter.Geddes@novascotia.ca>; Walker, Ernest <Ernest.Walker@novascotia.ca>  
<mailto:Ernest.Walker@novascotia.ca>; MacKinnon, David S <David.MacKinnon2@novascotia.ca>  
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<mailto:Jordan.Nikoloyuk@novascotia.ca>; Denis, Alex X <Alex.Denis@novascotia.ca>  
<mailto:Alex.Denis@novascotia.ca>; Sanford, Steve L <Steve.Sanford@novascotia.ca>  
<mailto:Steve.Sanford@novascotia.ca>  
**Cc:** Wright, Patricia E <Patricia.Wright@novascotia.ca> <mailto:Patricia.Wright@novascotia.ca>; Yeh,  
Helen X <Helen.Yeh@novascotia.ca> <mailto:Helen.Yeh@novascotia.ca>  
**Subject:** Alton Gas Meeting - Sept 30

Hello All,

This email is just to confirm that we will be having a meeting next Wednesday, September 30th, from 1.00pm till 3.00 pm in Boardroom 18 C Barrington Tower.

I have attached an agenda and the meeting notes with action items from the last meeting. I've also attached a CONFIDENTIAL DRAFT copy of the Industrial Approval for the Operation of the Brine Storage Pond for your review and comment.

Here again is the link for provincial folks to the shared drive: I:\Policy\Alton Gov Group.

Look forward to seeing you next week.

*Helen MacPhail*

Environmental Assessment Supervisor

Title:  
PATH File No:

Shubenacadie River - water withdrawal and effluent release and natural gas storage  
06-HMAR-MA7-00182

Habitat File No:

06-W7-182

Receive Date:

2006/08/11

Environmental Assessment Branch

Nova Scotia Environment  
1903 Barrington Street  
Suite 2085  
PO Box 442  
Halifax, NS B3J 2P8  
Tel 424-3960  
Fax: 424-6925

Action:	Information Received	Effective Date: Expiry Date - HADD/Serious Harm: Expiry Date - Other : Compensation/Offsetting: Included in List of Records: Species at Risk:
Time Spent (Hrs): Authorization Rationale:	0.00	
Directory: File Name: Document Type (Upload):	Re-alignment Other	File Extension: File Size: docx 16,619
Directory: File Name: Document Type (Upload):	150918 NSE Letter GasLine Modifications Field Truthir Other	File Extension: File Size: pdf 4,237,272



September 18, 2015

Steve Sanford  
Environmental Assessment Officer, Nova Scotia Environment  
Email: Steve.Sanford@novascotia.ca  
Phone: 902-424-7630

5151 Terminal Road  
Halifax, NS B3J 2P8

**Subject: Proposed Re-Alignment Field Truthing (June 2015)  
Alton Natural Gas Pipeline Project**

Dear Mr. Sanford,

This letter report outlines the findings of our field work completed along the proposed re-alignment section of the Alton Gas Line, in response to the NSE EA Branch review (see attached email from Helen McPhail dated February 5<sup>th</sup>, 2015) and as follow up to our initial report reviewing realignment options (January 7<sup>th</sup>, 2015).

#### **Wetlands**

WSP encountered and delineated three new wetlands (WL 22, 23 and 24; see Figure 1, attached) during 2015 field assessments of the proposed re-alignment. WL 23 and WL24 are forested wetlands dominated by spruce overstorey and a moss floor. WL 22 was identified by WSP during the previous field season (2014), and is classified as a disturbed shrub swamp, created by recent forestry activity. Wetland delineation data sheets are attached.

#### **Watercourses**

WSP encountered three watercourses along the proposed re-alignment (Figure 1). Fish habitat was assessed for each of the watercourses (WC) where the pipeline is proposed to cross. The crossing locations had defined banks with no riparian wetlands present. The assessment of fish habitat included watercourse characterization and water quality parameters as shown in Table 1 and 2. A comparison to water quality in typical fish habitat indicates that WC 7 had low quality due to low pH and dissolved oxygen parameters. WC 6 is contiguous with WL 12 and was determined to have fish habitat, based on its water quality, and being classified as a third order stream (see Table 1 and 2). No electrofishing was conducted due to the potential presence of species at risk (SAR) within the watercourse.

---

WSP Canada Inc.  
1 Spectacle Lake Drive  
Dartmouth, NS B3B 1X7  
T: 902-835-9955  
[www.wsppgroup.com](http://www.wsppgroup.com)



**Table 1. Fish Habitat Characterization for the Watercourses Surveyed by WSP along the New Proposed Alignment**

Watercourse ID	WC 7	WC 6
Name	Unnamed Channel	Watering Brook
Date of Assessment	Jun-15	Jun-15
Coordinates (Nad 83) (Easting, Northing)	483113 m E, 500344 m N	482659 m E, 5000759m N
Watercourse on 1:10000 NSGC maps	N	Y
Nature of watercourse	Narrow headwater channel	3rd Order Stream
Watercourse crossing proposed method	Dam and Pump	Dam and Pump
Potential Fish Presence within RoW	N	Y
Potential for SARA Species Present within RoW	N	Y
Rational for Fish Habitat Determination	Fish Habitat Assessment, seasonal flows, no connectivity	Fish Habitat Assessment
Approx. Length of Watercourse in RoW (m)	25	25
Average Bank Channel Width (m)	0.87	2.4
Maximum Depth (m)	0.14	0.11
Bank Stability (Left, Right)	Stable and vegetated	Stable and vegetated

**Table 2. Water Quality for the Watercourses Surveyed by WSP along the New Proposed Alignment**

Watercourse ID	Water Temperature (°C)	pH	Specific Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Discharge (m³/s)	TDS (g/L)
WC 7	12.8	3.87	14	6.15	59.5	ND	0.009
WC 6	16.71	6.27	139	8.47	89.2	ND	0.09





## Flora and Fauna

WSP conducted flora and fauna surveys within the new proposed re-alignment, on June 8<sup>th</sup>, 2015 outside the previously studied corridor (Stantec 2011). Transects were walked along the new proposed alignment (approximately 1km) by two field biologists approximately 20 m apart for rare flora and fauna. WSP did not identify any endangered or rare flora or fauna during the field survey.

A bird survey including transect point counts along the new proposed re-alignment (approximately 1 km) was conducted. Two migratory bird species that are listed as Sensitive by NSDNR were encountered in suitable nesting habitat. Cape May Warbler (*Setophaga tigrina* – S3B) and Yellow-bellied Flycatcher (*Empidonax flaviventris* – S3S4B) were recorded singing in proximity to WC 7 and WC 6, respectively. The Cape May Warbler was identified within the study corridor from 2011(Stantec). The Atlantic Canada Conservation Data Center (ACCDC) rank these birds as S3B (uncommon breeding) and S3S4B (uncommon-fairly common breeding). Alton Gas has previously stated that clearing of trees for this project will be completed in the winter between September 1<sup>st</sup> and April 30<sup>th</sup> to avoid bird breeding season, or if clearing/grubbing during bird breeding season NSE will be notified and bird nest surveys will occur prior to clearing and/or grubbing.

## Conclusion

Based on the field visits conducted for the proposed re-alignment of the Alton Gas pipeline, WSP recommends that the "Option A" re-alignment (as identified in our January 7<sup>th</sup>, 2015 report) be shifted slightly to provide a 30 metre buffer around WL 9 and avoid WL23 (See Figure 1). The final proposed alignment includes the following;

- two watercourse crossings (WC 6, WC7); and
- two wetland crossings (WL22, WL 24).

This alignment is considered to be the preferred pathway to minimize impacts on wetlands and watercourses. The new alignment avoids WL15, which has been identified as a wetland of special significance (WSS) due to the presence of SAR; but will cross WL 22, which is a poor quality wetland created by recent forestry activity. The two watercourses (WC 6, 7) have defined banks with no riparian wetlands at the proposed crossing areas. Only WC 6 has potential valuable fish habitat.

GIS shape files and metadata on all wetlands, watercourses, flora and fauna for this project will be submitted to NSDNR- Wildlife Division in Kentville and NSE in Halifax in order for them to update wetland inventory. Wetland plots have been established along the entire pipeline route to monitor potential direct and indirect impacts of construction. Baseline monitoring results will be provided in a separate report.



We trust that this letter meets your requirements at this time. If there are any questions, do not hesitate to contact our office.

This letter was prepared by Marina Ritchie, Biologist, and senior review was provided by Virgil Grecian, M.Sc. and Sean Cassidy, P.Eng.

Yours truly,

WSP Canada Inc.



Marina Ritchie, M.Sc.  
Biologist



Virgil Grecian, M.Sc.  
Senior Biologist

Enclosures: NSE EA Branch email - February 5, 2015

Figure 1 – Proposed Realignment June 2015

Wetland Delineation Sheets

CC: Brad Skinner, Nova Scotia Environment District Manager-Truro  
Email:Bradley.Skinner@novascotia.ca  
Phone: 902-893-5880

36 Inglis Place  
Truro, NS B2N 4B4

**Cassidy, Sean**

---

**From:** Birkett, David  
**Sent:** Thursday, February 05, 2015 10:39 AM  
**To:** Cassidy, Sean  
**Subject:** Fw: Alton Gas Pipeline modify routing.  
**Attachments:** Re-alignment.docx

Fyi. Let's discuss soon

Sent from my BlackBerry 10 smartphone on the TELUS network.

---

**From:** MacPhail, Helen <[Helen.MacPhail@novascotia.ca](mailto:Helen.MacPhail@novascotia.ca)>  
**Sent:** Thursday, February 5, 2015 10:06  
**To:** Birkett, David  
**Cc:** Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Weseloh McKeane, Sean; Dera, Beata E; Skinner, Bradley; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; 'carol.Jacobi@dfo-mpo.gc.ca'; 'mark.mclean@dfo-mpo.gc.ca'; Bird, Michael W; Fairbairn, Heather J; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; Blair, David; McNally, Kelly D  
**Subject:** RE: Alton Gas Pipeline modify routing.

Hello David,

Following a review of the Alton Natural Gas Pipeline Project Proposed Re-Alignment (January 7, 2015), it has been determined that no further environmental assessment (EA) is required, with the proviso that an archaeological impact assessment, as well as physical assessments for wetlands and watercourses are completed for the new alignment. We agree that Option A appears to be the preferred route, subject to the results of the further studies mentioned previously. I have attached a summary of the comments received from government reviewers. In addition, all of the conditions in the EA Approval (May 21, 2013) are still relevant and must be met.

In the event that you propose further changes to the project, please inform the EA Branch for an evaluation.

Regards,

*Helen MacPhail*

---

Environmental Assessment Supervisor  
**Environmental Assessment Branch**  
Nova Scotia Environment  
1903 Barrington Street  
Suite 2085  
PO Box 442  
Halifax, NS B3J 2P8  
Tel: 424-3960  
Fax: 424-6925

---

**From:** Birkett, David  
**Sent:** Friday, January 09, 2015 4:43 PM

Reviewer	Comment
Wetland Specialist NS Environment	It is difficult to assess the potential impact without having all areas field assessed and all wetlands fully delineated. Both re-alignment options should be physically assessed in the field for wetlands. Wetland number 12 contains rare plants, however they are not listed as an endangered species. Wetland number 15 does contain species at risk, which makes this a wetland of special significance (WSS ) and cannot be altered. Monitoring should be conducted at all wetlands adjacent to the development areas so indirect impacts can be accurately quantified and protect rare and at risk species. If a wetland alteration is essential, the proponent should consult with those who did the work on the Encana project in Antigonish a few years ago as they had good success in restoring wetlands on that project. Regardless of approval, the proponent should be required to provide GIS shape files and metadata on all wetlands that were delineated for this project to Frances MacKinnon from NSDNR- Wildlife Division in Kentville and to Jason Power from NSE in Halifax so the wetland inventory can be updated.
Water Quality Specialist NS Environment	<ol style="list-style-type: none"> <li>1. In the current report the Option A route is recommended by the consultant based on minimizing impacts to the environment with; <ul style="list-style-type: none"> <li>-fewer watercourses and wetlands being disturbed,</li> <li>-the route alignment being shorter and straighter,</li> <li>-and route being located on higher ground and through less preferred habitat for rare and endangered species.</li> </ul> </li> <li>2. Based on the above rationale the recommended option A appears appropriate. However, since the report cautions that the Option A re-alignment "was not physically assessed in the field", the assessment results and associated conclusions of this report should probably be confirmed through additional field work to ground truth the desk top assessments.</li> </ol>
Protected Areas NS Environment	With reference to the proposed pipeline re-routing, the change makes little difference from a protected areas program perspective.
Wildlife Division NS Department of Natural Resources	We have no issues with the new location proposed. All previous conditions on the initial EA Submitted on the original are still relevant and should be applied.
Office of Aboriginal Affairs	<p>I have reviewed Alton's gas pipeline route modification proposal and have no concerns from OAA's perspective.</p> <p>Further to our discussion yesterday, I would like to note that this information will need to be shared with the Mi'kmaq, both Sipekne'katik and the KMKNO, through the formal Consultation process. The Mi'kmaq are likely to have an interest in potential impacts to wetlands, watercourse crossings and the pipeline route as it relates to Crown land / protected areas .</p>

	I will follow up with you regarding next steps.
<b>Communities, Culture and Heritage</b>	CCH has reviewed the revised pipeline routing and recommends an archaeological resources impact assessment on the new routing. The modified routing you provided information on shows some new water body crossings that were not previously included in the 2011 assessment.
<b>Fisheries Protection Program Fisheries and Oceans Canada</b>	We have reviewed the document and understand that the proposed re-alignment options for the 3.5 km section of the gas pipeline route, south of Cloverdale Rd and east of Stewiacke, would involve either 3 watercourse crossings (Option A), or 4 watercourse crossings (Option B), as opposed to the 6 crossings for this section of the original alignment. Site specific details such as crossing location, watercourse characteristics, fish and fish habitat features, proposed crossing method, potential impacts and mitigations have not been discussed in the report. DFO will review the site specific details when watercourse applications are referred from NSE as part of the provincial watercourse alteration approval process. The proponent should be made aware that the project falls within a watershed that contains <i>critical habitat</i> for the endangered Inner Bay of Fundy (iBoF) Atlantic salmon as defined under section 2 of the <i>Species at Risk Act</i> (SARA), and the project details will also be reviewed to determine whether crossings will adversely impact iBoF Salmon and contravene sections 32, 33 and 58 of the <i>Species at Risk Act</i> . DFO would provide advice to the province regarding the crossings upon completion of the reviews.



### WETLAND DELINEATION DATA FORM – NOVA SCOTIA

Project/Site: Alton Municipality/County: Colchester Co. Sampling Date: June 9/15  
Applicant/Owner: Altogas Storage LP. Sampling Point: Wetland 24-Wet  
Investigator(s): MLR, VDG Affiliation: WSP Canada Inc  
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave  
Slope (%): \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: ATS 77 Zone 5  
Soil Map Unit Name/Type: \_\_\_\_\_ Wetland Type: Treed / Shrub Swamp  
Are climatic / hydrologic conditions on the site typical for this time of year? Yes \_\_\_\_\_ No ☒ (If no, explain in Remarks.)  
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes \_\_\_\_\_ No ☒  
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

#### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	
Remarks: (Explain alternative procedures here or in a separate report.)	

#### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>15m</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>red spruce</u>	<u>10%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
2. <u>grey birch</u>	<u>15%</u>		<u>fac</u>
3. <u>red maple</u>	<u>10%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
4. _____	_____		_____
5. _____	_____		_____
= Total Cover			
Sapling/Shrub Stratum (Plot size: <u>5m</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Alnus incana</u>	<u>30%</u>	<input checked="" type="checkbox"/>	<u>facw</u>
2. <u>red spruce</u>	<u>5%</u>		<u>fac</u>
3. <u>red maple</u>	<u>2%</u>		<u>fac</u>
4. <u>Kalmia angustifolia</u>	<u>3%</u>		<u>fac</u>
5. <u>rubus hispidus</u>	<u>1%</u>		<u>fac</u>
6. <u>Vaccinium myrtilloides</u>	<u>1%</u>		<u>fac</u>
= Total Cover			
Herb Stratum (Plot size: <u>1m</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Equisetum arvense</u>	<u>&lt;1%</u>		<u>fac</u>
2. <u>Maianthemum canadense</u>	<u>5%</u>		<u>fac</u>
3. <u>Spiraea alba</u>	<u>&lt;1%</u>		<u>fac</u>
4. _____	_____		_____
5. _____	_____		_____
6. _____	_____		_____
7. _____	_____		_____
8. _____	_____		_____
9. _____	_____		_____
10. _____	_____		_____
= Total Cover			
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>sphagnum</u>	<u>90%</u>		_____
2. _____	_____		_____
= Total Cover			

**Dominance Test worksheet:**  
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)  
Total Number of Dominant Species Across All Strata: 3 (B)  
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

**Prevalence Index worksheet:**  
Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
OBL species \_\_\_\_\_ x 1 = \_\_\_\_\_  
FACW species \_\_\_\_\_ x 2 = \_\_\_\_\_  
FAC species \_\_\_\_\_ x 3 = \_\_\_\_\_  
FACU species \_\_\_\_\_ x 4 = \_\_\_\_\_  
UPL species \_\_\_\_\_ x 5 = \_\_\_\_\_  
Column Totals: \_\_\_\_\_ (A) \_\_\_\_\_ (B)  
Prevalence Index = B/A = \_\_\_\_\_

**Hydrophytic Vegetation Indicators:**  
\_\_\_\_ Rapid Test for Hydrophytic Vegetation  
☒ Dominance Test is >50%  
\_\_\_\_ Prevalence Index is ≤3.0<sup>1</sup>  
\_\_\_\_ Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)  
\_\_\_\_ Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ☒ No \_\_\_\_\_

Remarks: (Include photo numbers here or on a separate sheet.)

# SOIL

Sampling Point: W29-W24

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)									
Depth (inches)	Matrix		Redox Features			Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%					
0-15cm	Gley 1	7/10 90%	10YR 5/8	10%			PL		
15-57cm	Gley 1	7/10 70%	10YR 5/8	30%			M		

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Iron-Manganese Masses (F12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Polyvalue Below Surface (S8)	
<input type="checkbox"/> Thin Dark Surface (S9)	
<input checked="" type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if observed):</b> Type: <u>bedrock</u> Depth (inches): <u>57cm</u>	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks:	

# HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
<b>Primary Indicators (minimum of one is required; check all that apply)</b> <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>11</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>11</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	



# WETLAND DELINEATION DATA FORM – NOVA SCOTIA

Project/Site: Altan gasline Municipality/County: Colchester Co. Sampling Date: June 9/15  
 Applicant/Owner: Alta gas storage LP. Sampling Point: Wetland 24-up1  
 Investigator(s): MLP, vDG Affiliation: WSP Canada Inc  
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): convex  
 Slope (%): 5% Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: ATS 77 Zone 5  
 Soil Map Unit Name/Type: \_\_\_\_\_ Wetland Type: \_\_\_\_\_

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No \_\_\_\_\_  
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	
Remarks: (Explain alternative procedures here or in a separate report.)	

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>15m</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. <u>white spruce (Picea glauca)</u>	<u>15%</u>	<input checked="" type="checkbox"/>	<u>fac</u>	
2. <u>white pine (Pinus strobus)</u>	<u>1%</u>		<u>fac</u>	
3. <u>red maple (Acer rubrum)</u>	<u>5%</u>		<u>fac</u>	
4. <u>gray birch (Betula populifolia)</u>	<u>5%</u>		<u>fac</u>	
5. <u>red spruce (Picea rubens)</u>	<u>2%</u>		<u>fac</u>	
= Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: <u>10m</u>)</b>				
1. <u>white spruce</u>	<u>5%</u>	<input checked="" type="checkbox"/>	<u>fac</u>	
2. <u>red spruce</u>	<u>3%</u>		<u>fac</u>	
3. <u>Viburnum nudum</u>	<u>5%</u>	<input checked="" type="checkbox"/>	<u>fac</u>	
4. <u>Kalmia angust</u>	<u>3%</u>		<u>fac</u>	
5. <u>rosa sp.</u> <u>vacinium angustifolium</u>	<u>1%</u> <u>5%</u>		<u>fac</u> <u>fac</u>	
= Total Cover				<b>Hydrophytic Vegetation Indicators:</b> ___ Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% ___ Prevalence Index is ≤3.0 <sup>1</sup> ___ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<b>Herb Stratum (Plot size: <u>1m</u>)</b>				
1. <u>cornus canadensis</u>	<u>30%</u>	<input checked="" type="checkbox"/>	<u>facu</u>	
2. <u>maianthemum canadense</u>	<u>5%</u>		<u>fac</u>	
3. <u>pteridium equisetum</u>	<u>5%</u>		<u>facu</u>	
4. <u>single horsetail (Equisetum arvense)</u>	<u>1%</u>		<u>fac</u>	
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
= Total Cover				<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No _____
<b>Woody Vine Stratum (Plot size: _____)</b>				
1. _____				
2. _____				
= Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				



# WETLAND DELINEATION DATA FORM – NOVA SCOTIA

Project/Site: Alton Municipality/County: Colchester Co. Sampling Date: June 9/15  
Applicant/Owner: Alta Gas Storage LP Sampling Point: WTL 23 Wet  
Investigator(s): VDG, MLR Affiliation: WSP Canada Inc.  
Landform (hillslope, terrace, etc.): none Local relief (concave, convex, none): none  
Slope (%): 0% Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: ATS 77 zones  
Soil Map Unit Name/Type: \_\_\_\_\_ Wetland Type: Treed Swamp  
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No \_\_\_\_\_ (If no, explain in Remarks.)  
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No \_\_\_\_\_  
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____ If yes, optional Wetland Site ID: _____
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No _____	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No _____	
Remarks: (Explain alternative procedures here or in a separate report.)		

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>15m</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer rubrum</u>	<u>10%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
2. <u>white birch (Betula pop.)</u>	<u>5%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
3. <u>red spruce (Picea rubens)</u>	<u>30%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
4. <u>Abies balsamea</u>	<u>15%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
5. _____	_____	_____	_____
= Total Cover			
Sapling/Shrub Stratum (Plot size: <u>10m</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Balsam fir (Abies balsamea)</u>	<u>3%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
2. <u>red spruce (Picea rubens)</u>	<u>2%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
= Total Cover			
Herb Stratum (Plot size: <u>1m</u> )	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Carex trisperma</u>	<u>10%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
2. <u>Trientalis borealis</u>	<u>1%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
3. <u>Mnium anthracinum canadense</u>	<u>5%</u>	<input checked="" type="checkbox"/>	<u>fac</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
= Total Cover			
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
= Total Cover			
Remarks: (Include photo numbers here or on a separate sheet.)			

**Dominance Test worksheet:**  
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)  
Total Number of Dominant Species Across All Strata: 3 (B)  
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

**Prevalence Index worksheet:**  
Total % Cover of: \_\_\_\_\_ Multiply by:  
OBL species \_\_\_\_\_ x 1 = \_\_\_\_\_  
FACW species \_\_\_\_\_ x 2 = \_\_\_\_\_  
FAC species \_\_\_\_\_ x 3 = \_\_\_\_\_  
FACU species \_\_\_\_\_ x 4 = \_\_\_\_\_  
UPL species \_\_\_\_\_ x 5 = \_\_\_\_\_  
Column Totals: \_\_\_\_\_ (A) \_\_\_\_\_ (B)  
Prevalence Index = B/A = \_\_\_\_\_

**Hydrophytic Vegetation Indicators:**  
☐ Rapid Test for Hydrophytic Vegetation  
☒ Dominance Test is >50%  
☐ Prevalence Index is ≤3.0<sup>1</sup>  
☐ Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)  
☐ Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)  
  
<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ☒ No \_\_\_\_\_

# SOIL

Sampling Point: WLT 23 wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-17cm	Gley 10YR 9/1	90%	10YR 5/8	10%		PL		
17cm-58cm	Gley 10YR 9/1	90%	10YR 5/8	30%		M		

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input checked="" type="checkbox"/> Loamy Gleyed Matrix (F2)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Coast Prairie Redox (A16)
	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)
	<input type="checkbox"/> Iron-Manganese Masses (F12)
	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
	<input type="checkbox"/> Red Parent Material (TF2)
	<input type="checkbox"/> Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):	Hydric Soil Present?
Type: <u>Rock</u>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Depth (inches): <u>58cm</u>	
Remarks:	

## HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
<u>Primary Indicators (minimum of one is required; check all that apply)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Water-Stained Leaves (B9)	
<input type="checkbox"/> Aquatic Fauna (B13)	
<input type="checkbox"/> Marl Deposits (B15)	
<input checked="" type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	
<input checked="" type="checkbox"/> Presence of Reduced Iron (C4)	
<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	
<input type="checkbox"/> Thin Muck Surface (C7)	
<input type="checkbox"/> Other (Explain in Remarks)	

Field Observations:	Wetland Hydrology Present?
Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>"</u>	
Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>"</u> (includes capillary fringe)	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

### WETLAND DELINEATION DATA FORM – NOVA SCOTIA

Project/Site: Alton gas line Municipality/County: Colchester Co. Sampling Date: June 9/15  
Applicant/Owner: Alta gas Storage LP. Sampling Point: Wetland 23 upl.  
Investigator(s): VDG, MLR Affiliation: WSP Canada Inc.  
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): convex  
Slope (%): <1% Lat: N Long: E Datum: ATS 77 Zone 5  
Soil Map Unit Name/Type: \_\_\_\_\_ Wetland Type: H<sub>1</sub>  
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No \_\_\_\_\_ (If no, explain in Remarks.)  
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes \_\_\_\_\_ No \_\_\_\_\_  
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

#### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	
Remarks: (Explain alternative procedures here or in a separate report.)	

#### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>15m</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)	
1. <u>red spruce (Picea rubens)</u>	<u>35</u>	<input checked="" type="checkbox"/>	<u>fac</u>		
2. <u>Abies balsamea</u>	<u>15</u>	<input checked="" type="checkbox"/>	<u>fac</u>		
3. <u>Acer rubrum</u>	<u>30</u>	<input checked="" type="checkbox"/>	<u>fac</u>		
4. _____	_____	_____	_____		
_____ = Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>10m</u> )	_____	_____	_____		
1. <u>Abies balsamea</u>	<u>5%</u>	_____	<u>fac</u>		
2. <u>Red spruce (Picea rubens)</u>	<u>2%</u>	_____	<u>fac</u>		
3. _____	_____	_____	_____		
_____ = Total Cover				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
Herb Stratum (Plot size: <u>1m</u> )	_____	_____	_____		
1. <u>star flower (Trientalis borealis)</u>	<u>1%</u>	_____	<u>fac</u>		
2. <u>Maianthemum canadense</u>	<u>2%</u>	_____	<u>fac</u>		
3. _____	_____	_____	_____		
_____ = Total Cover				<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No _____	
Woody Vine Stratum (Plot size: _____)	_____	_____	_____		
1. <u>shrubs moss</u>	<u>20%</u>	_____	_____		
2. <u>liverwort</u>	<u>5%</u>	_____	_____	_____ = Total Cover	
Remarks: (Include photo numbers here or on a separate sheet.)					

## SOIL

Sampling Point: \_\_\_\_\_

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
0-14cm	5Y 7/1	100% clay					leached organic soil
14cm-46cm	5YR 5/3	100%					

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Iron-Manganese Masses (F12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if observed):</b> Type: <u>bedrock</u> Depth (inches): <u>46cm</u>		Hydric Soil Present?    Yes _____    No <input checked="" type="checkbox"/>
Remarks:		

## HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)	
<b>Primary Indicators (minimum of one is required; check all that apply)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)	
<b>Field Observations:</b> Surface Water Present?    Yes _____    No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present?    Yes _____    No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present?    Yes _____    No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)		Wetland Hydrology Present?    Yes _____    No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		



# WETLAND DELINEATION DATA FORM – NOVA SCOTIA

Project/Site: Alton gasline Municipality/County: Colchester Co. Sampling Date: June 9/15  
 Applicant/Owner: Alta gas Storage LP. Sampling Point: Well and 22-wet  
 Investigator(s): NLR, VDG Affiliation: NSP Canada Inc.  
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none  
 Slope (%): 1% Lat: 50° 24' 40" N Long: 56° 12' 50" W Datum: ATS 77 Zone 5  
 Soil Map Unit Name/Type: \_\_\_\_\_ Wetland Type: Shrub swamp  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation ☒, Soil ☒, or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No \_\_\_\_\_  
 Are Vegetation no, Soil no, or Hydrology hc naturally problematic? (If needed, explain any answers in Remarks.) cut / skidder tracks

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____ If yes, optional Wetland Site ID: _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	
Remarks: (Explain alternative procedures here or in a separate report.)	

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>15m</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. <u>Abies balsamea</u>	<u>5</u>	<input checked="" type="checkbox"/>	<u>fac</u>	
2. <u>Acer rubrum</u>	<u>15</u>	<input checked="" type="checkbox"/>	<u>fac</u>	
3. <u>Betula populifolia</u>	<u>10</u>		<u>fac</u>	
4. _____	_____			
_____ = Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: <u>10m</u>)</b> 1. <u>Acer rubrum</u> <u>7%</u> <input checked="" type="checkbox"/> <u>fac</u> 2. <u>Sweet fern (Comptonia peregrina)</u> <u>3%</u> <input checked="" type="checkbox"/> <u>upl</u> 3. <u>Kalmia angustifolia</u> <u>2%</u> <input checked="" type="checkbox"/> <u>fac</u> 4. <u>Vaccin. angustifolia</u> <u>2%</u> <input checked="" type="checkbox"/> <u>fac</u> 5. <u>Prunus pennsylvanica</u> <u>5%</u> <input checked="" type="checkbox"/> <u>facu</u> 6. <u>White Spruce (Pinus glauca)</u> <u>8%</u> <input checked="" type="checkbox"/> <u>facu</u> 7. <u>Pinus canadensis</u> <u>1%</u> <input checked="" type="checkbox"/> <u>facu</u>				
_____ = Total Cover				
<b>Herb Stratum (Plot size: <u>1m</u>)</b> 1. <u>Betula populifolia</u> <u>15%</u> <input checked="" type="checkbox"/> 2. _____ 3. <u>Herb</u> 4. <u>Carex sp.</u> <u>1%</u> 5. <u>Aster sp.</u> <u>1%</u> 6. <u>Maianthemum canadense</u> <u>1%</u> 7. _____ 8. _____ 9. _____ 10. _____				
_____ = Total Cover				
<b>Woody Vine Stratum (Plot size: _____)</b> 1. _____ 2. _____ _____ = Total Cover				<b>Hydrophytic Vegetation Indicators:</b> _____ Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% _____ Prevalence Index is ≤3.0 <sup>1</sup> _____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No _____				
Remarks: (Include photo numbers here or on a separate sheet.)				





# WETLAND DELINEATION DATA FORM – NOVA SCOTIA

Project/Site: Aldon gasoline Municipality/County: Colchester Co Sampling Date: June 9/15  
 Applicant/Owner: Altogas Storage LP. Sampling Point: Wetland 22 upland  
 Investigator(s): MLR, VDB Affiliation: WSP Canada Inc.  
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none  
 Slope (%): >1% Lat: 5602441.93 m N Long: 5601247.66 m E Datum: ATS 77 Zone 5  
 Soil Map Unit Name/Type: \_\_\_\_\_ Wetland Type: \_\_\_\_\_

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation ☒, Soil ☒, or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes \_\_\_\_\_ No ☒  
 Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.) disturbed tree cut / skidder tracks

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland?	Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes _____ No <input checked="" type="checkbox"/>	If yes, optional Wetland Site ID: _____	
Wetland Hydrology Present?	Yes _____ No <input checked="" type="checkbox"/>		
Remarks: (Explain alternative procedures here or in a separate report.)			

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>15m</u> )	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. <u>Ames balsamea</u>	<u>5%</u>		<u>fac</u>	
2. <u>Acer rubrum</u>	<u>15%</u>	<input checked="" type="checkbox"/>	<u>fac</u>	
3. <u>Betula populifolia</u>	<u>10%</u>		<u>fac</u>	
4. _____	_____		_____	
= Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: <u>10m</u>)</b>				
1. <u>Betula populifolia</u>	<u>15</u>	<input checked="" type="checkbox"/>	<u>fac</u>	
2. <u>white spruce (Picea glauca)</u>	<u>8</u>		<u>fac</u>	
3. <u>red spruce (Picea rubens)</u>	<u>2%</u>		<u>fac</u>	
4. <u>prunus pennsylvanica</u>	<u>2%</u>		<u>facu</u>	<b>Hydrophytic Vegetation Indicators:</b> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
5. <u>Kalmia angustata</u>	<u>15%</u>		<u>fac</u>	
= Total Cover				
<b>Herb Stratum (Plot size: <u>2m</u>)</b>				
1. <u>vacinium angustifolium</u>	<u>1%</u>		<u>fac</u>	
2. <u>rubus hispidus</u>	<u>1%</u>		<u>facw</u>	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No _____
3. <u>sweet fern (Comptonia peregrina)</u>	<u>2%</u>		<u>upl</u>	
4. _____	_____		_____	
5. <u>Herb</u>	_____		_____	
6. <u>Cypripedium acaule</u>	<u>1%</u>		<u>fac</u>	
7. <u>Maianthemum canadense</u>	<u>3%</u>		<u>fac</u>	<b>Remarks:</b> (Include photo numbers here or on a separate sheet.)
8. <u>Coptis trifoliata</u>	<u>5%</u>	<input checked="" type="checkbox"/>	<u>fac</u>	
9. <u>Doellingeria umbellata</u>	<u>1%</u>		<u>fac</u>	
10. <u>Pteridium aquilinum</u>	<u>2%</u>		<u>facu</u>	
Star flower <u>Trientalis borealis</u>	<u>1%</u>		<u>fac</u>	
= Total Cover				
<b>Woody Vine Stratum (Plot size: _____)</b>				
1. _____	_____		_____	
2. _____	_____		_____	
= Total Cover				

## SOIL

Sampling Point: Wetland 22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
31cm	7YR 1/4	100%					clay

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Coast Prairie Redox (A16)
	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)
	<input type="checkbox"/> Iron-Manganese Masses (F12)
	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
	<input type="checkbox"/> Red Parent Material (TF2)
	<input type="checkbox"/> Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: \_\_\_\_\_

Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes \_\_\_\_\_ No ☒

Remarks:

## HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
<u>Primary Indicators (minimum of one is required; check all that apply)</u>		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Marl Deposits (B15)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		<input type="checkbox"/> FAC-Neutral Test (D5)
<b>Field Observations:</b>		
Surface Water Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Water Table Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
(includes capillary fringe)		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

## Alton Watercourse 100

Bed material: rock and stone some fine (silt and clay)  
Bank material: grass and forest vegetation.

Width: 1- 41 cm  
2- 50 cm  
3- 29 cm

Slope: 1%

Depth: 1- 42 mm  
2- 51 mm  
3- 75 mm

Velocity: 50 cm / 1.5 sec

Bank stability: stable

- No fish Habitat

Horiba

12.16 °C

6.15 pH

25 pH mv

168 ORP mv

0.17 mc/cm

8.6 ntu

4.52 mg/L DO

42.5% DO

0.01 g/L TDS

0.0 ppt

Watercourse 101:

Depth: 5 cm, 10.5 cm, 10.6 cm

Width: 64 cm, 82 cm, 69 cm

slope: 2%

Velocity: 85 / m

Bank stability: stable

Canopy cover: west bank: 75%

east " " : 95%  
Spruce, maple, birch, poplar  
MIX WOOD

bed material: rock, pebbles, sand, not embedded

bank material: moss lined over soil

- No fish habitat.

12.8 °C

3.87 pH

116 pH mv

296 ORP mv

0.014 mc/cm

0.0 NTU

6.15 mg/L DO

59.5% DO

0.009 g/L TDS

0.0 ppt

0.0 °C

# Alton Watercourse 102

16.71 °C

6.27 pH

centre width : 2.4m

Depth: 12cm

11 pHmv

ds width : 2.7m

Depth: 8cm

224 ORPmv

US width : 2m

Depth: 11.5cm

0.139 ms/cm

slope: 2%

0.0 NTU

bank stability: stable

8.47 mg/L DO

canopy: mixed wood

west bank 60%

89.2 % DO

east bank 75%

0.090 g/L TDS

- Fish habitat

0.1 ppt

0.00+

bed material: large rock, cobbles and sand.

bank material: veg over organic soils  
moss, grass, general forest veg.

velocity 2.5 sec/m



# Watercourse (WC) Alteration - Field Inspection Checklist

Date of Inspection: June 12/15

Project No: 111-26678

Completed By: M.L.R. SAB

Project Location: Athol gasline

near  
24 - new  
crossing area.

## Important information to gather during the field inspection:

- Location of proposed crossing (coordinates) :
- Photos of the crossing site, upstream/downstream & existing culvert (if applicable);
- WC features at the crossing site i.e. streambed material, bank material, width and depth of channel (see below);
- Survey data required (only if a closed-bottom culvert is proposed), elevations should be collected a minimum of 30m on either side of proposed crossing location. Points to be collected at the top of streambed riffles and bottom of pools. If questionable, collect points every 5m (see below);
- Are there any aquatic animals visible i.e. insects, fish etc. Be sure to check beneath the rocks on bed of WC for insects :
- Approximate flow of WC (m/s) :
- Walk ~100m upstream & downstream, collect photos to help identify if the WC is fish bearing.

## Collect a minimum of the following:

STA	Streambed Elevation (m)	Description*	Width of Channel (m)	Depth of Channel (cm)
0+000**				

\*Description i.e. top of riffle or bottom of pool etc.

\*\* 0+000 represents the middle of the proposed crossing

Notes: streambed: Rock, sand, muck

bank material: Moss and reg wood/and species

canopy cover: North 75% South: 60% pine, spruce, maple

width: 0.56m 0.86m, @ 1.2m

depth: 0.06m, 0.12m, 0.23m

flow: <0.1m/s basically no flow at crossing.

slope: 0.5%

Reviewer	Comment
<b>Wetland Specialist NS Environment</b>	<p>It is difficult to assess the potential impact without having all areas field assessed and all wetlands fully delineated. Both re-alignment options should be physically assessed in the field for wetlands. Wetland number 12 contains rare plants, however they are not listed as an endangered species. Wetland number 15 does contain species at risk, which makes this a wetland of special significance (WSS ) and cannot be altered. Monitoring should be conducted at all wetlands adjacent to the development areas so indirect impacts can be accurately quantified and protect rare and at risk species. If a wetland alteration is essential, the proponent should consult with those who did the work on the Encana project in Antigonish a few years ago as they had good success in restoring wetlands on that project. Regardless of approval, the proponent should be required to provide GIS shape files and metadata on all wetlands that were delineated for this project to Frances MacKinnon from NSDNR- Wildlife Division in Kentville and to Jason Power from NSE in Halifax so the wetland inventory can be updated.</p>
<b>Water Quality Specialist NS Environment</b>	<ol style="list-style-type: none"> <li>1. In the current report the Option A route is recommended by the consultant based on minimizing impacts to the environment with; <ul style="list-style-type: none"> <li>-fewer watercourses and wetlands being disturbed,</li> <li>-the route alignment being shorter and straighter,</li> <li>-and route being located on higher ground and through less preferred habitat for rare and endangered species.</li> </ul> </li> <li>2. Based on the above rationale the recommended option A appears appropriate. However, since the report cautions that the Option A re-alignment “was not physically assessed in the field”, the assessment results and associated conclusions of this report should probably be confirmed through additional field work to ground truth the desk top assessments.</li> </ol>
<b>Protected Areas NS Environment</b>	<p>With reference to the proposed pipeline re-routing, the change makes little difference from a protected areas program perspective.</p>
<b>Wildlife Division NS Department of Natural Resources</b>	<p>We have no issues with the new location proposed. All previous conditions on the initial EA Submitted on the original are still relevant and should be applied.</p>
<b>Office of Aboriginal Affairs</b>	<p>I have reviewed Alton’s gas pipeline route modification proposal and have no concerns from OAA’s perspective.</p> <p>Further to our discussion yesterday, I would like to note that this information will need to be shared with the Mi’kmaq, both Sipekne’katik and the KMKNO, through the formal Consultation process. The Mi’kmaq are likely to have an interest in potential impacts to wetlands, watercourse crossings and the pipeline route as it relates to Crown land / protected areas .</p>



	I will follow up with you regarding next steps.
<b>Communities, Culture and Heritage</b>	CCH has reviewed the revised pipeline routing and recommends an archaeological resources impact assessment on the new routing. The modified routing you provided information on shows some new water body crossings that were not previously included in the 2011 assessment.
<b>Fisheries Protection Program Fisheries and Oceans Canada</b>	We have reviewed the document and understand that the proposed re-alignment options for the 3.5 km section of the gas pipeline route, south of Cloverdale Rd and east of Stewiacke, would involve either 3 watercourse crossings (Option A), or 4 watercourse crossings (Option B), as opposed to the 6 crossings for this section of the original alignment. Site specific details such as crossing location, watercourse characteristics, fish and fish habitat features, proposed crossing method, potential impacts and mitigations have not been discussed in the report. DFO will review the site specific details when watercourse applications are referred from NSE as part of the provincial watercourse alteration approval process. The proponent should be made aware that the project falls within a watershed that contains <i>critical habitat</i> for the endangered Inner Bay of Fundy (iBoF) Atlantic salmon as defined under section 2 of the <i>Species at Risk Act</i> (SARA), and the project details will also be reviewed to determine whether crossings will adversely impact iBoF Salmon and contravene sections 32, 33 and 58 of the <i>Species at Risk Act</i> . DFO would provide advice to the province regarding the crossings upon completion of the reviews.

Title:  
PATH File No:

Shubenacadie River - water withdrawal and effluent release and natural gas storage  
06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

95

September 29, 2015

To:

MacNeil, Jack

Action Date:

Document Date:

September 29, 2015

From:

MacPhail, Helen

Description:

**From:** MacPhail, Helen [mailto:Helen.MacPhail@novascotia.ca]

**Sent:** 2015-September-29 9:51 AM

**To:** Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Weseloh McKeane, Sean; Dera, Beata E; Skinner, Bradley; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; Jacobi, Carol; McLean, Mark G; Bird, Michael W; Fairbairn, Heather J; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; Denis, Alex X; Sanford, Steve L

**Cc:** Wright, Patricia E; Yeh, Helen X

**Subject:** RE: Alton Gas Meeting - Sept 30

Hello All,

For your information and review, and to help with the discussion at tomorrow's meeting, I have attached updated follow-up documents for both the storage facility and pipeline EA conditions. In addition, I shall forward an email that I received yesterday regarding the field-truthing work carried-out by Alton on the slight re-alignment of the gas pipeline.

Regards,

*Helen MacPhail*

Environmental Assessment Supervisor

**Environmental Assessment Branch**

Nova Scotia Environment

1903 Barrington Street

Suite 2085

PO Box 442

Halifax, NS B3J 2P8



Shubenacadie River - water withdrawal and effluent release and natural gas storage  
Habitat File No: 06-W7-182

Title:  
PATH File No:

06-HMAR-MA7-00182

Receive Date: 2006/08/11

Tel 424-3960

Fax: 424-6925

**From:** MacPhail, Helen

**Sent:** Friday, September 25, 2015 11:35 AM

**To:** Hines, Samantha E <Samantha.Hines@novascotia.ca>; Dera, Beata E <Beata.Dera@novascotia.ca>; Cameron, Melanie J <Melanie.Cameron@novascotia.ca>; Skinner, Bradley <Bradley.Skinner@novascotia.ca>; Bekkers, Kevin F <Kevin.Bekkers@novascotia.ca>; Brenton, Jay <Jay.Brenton@novascotia.ca>; Weseloh McKeane, Sean <Sean.WeselohMcKeane@novascotia.ca>

<mailto:Sean.WeselohMcKeane@novascotia.ca>; Dera, Beata E <Beata.Dera@novascotia.ca>  
<mailto:Beata.Dera@novascotia.ca>; Skinner, Bradley <Bradley.Skinner@novascotia.ca>  
<mailto:Bradley.Skinner@novascotia.ca>; Brenton, Jay <Jay.Brenton@novascotia.ca>  
<mailto:Jay.Brenton@novascotia.ca>; Maass, Oliver C <Oliver.Maass@novascotia.ca>  
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<mailto:carol.Jacobi@dfo-mpo.gc.ca>; 'mark.mclean@dfo-mpo.gc.ca' <mark.mclean@dfo-mpo.gc.ca>  
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<mailto:MT.Grant@ec.gc.ca>; Robichaud, Loretta L <Loretta.Robichaud@novascotia.ca>  
<mailto:Loretta.Robichaud@novascotia.ca>; Devine, Lisa J <Lisa.Devine@novascotia.ca>  
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<mailto:Ernest.Walker@novascotia.ca>; MacKinnon, David S <David.MacKinnon2@novascotia.ca>  
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<mailto:Jack.MacNeil@dfo-mpo.gc.ca>; Potter, Heather L <Heather.Potter@novascotia.ca>  
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Title:  
PATH File No:

Shubenacadie River - water withdrawal and effluent release and natural gas storage  
06-HMAR-MA7-00182

Habitat File No: 06-W7-182

Receive Date: 2006/08/11  
de la Loi sur l'accès à l'information.

<mailto:Jordan.Nikoloyuk@novascotia.ca>; Denis, Alex X <Alex.Denis@novascotia.ca>  
<mailto:Alex.Denis@novascotia.ca>; Sanford, Steve L <Steve.Sanford@novascotia.ca>  
<mailto:Steve.Sanford@novascotia.ca>

**Cc:** Wright, Patricia E <Patricia.Wright@novascotia.ca> <mailto:Patricia.Wright@novascotia.ca>; Yeh, Helen X <Helen.Yeh@novascotia.ca> <mailto:Helen.Yeh@novascotia.ca>

**Subject:** Alton Gas Meeting - Sept 30

Hello All,

This email is just to confirm that we will be having a meeting next Wednesday, September 30th, from 1:00pm till 3:00 pm in Boardroom 18 C Barrington Tower.

I have attached an agenda and the meeting notes with action items from the last meeting. I've also attached a CONFIDENTIAL DRAFT copy of the Industrial Approval for the Operation of the Brine Storage Pond for your review and comment.

Here again is the link for provincial folks to the shared drive: I:\Policy\Alton Gov Group.

Look forward to seeing you next week.

*Helen MacPhail*

Environmental Assessment Supervisor  
**Environmental Assessment Branch**  
Nova Scotia Environment  
1903 Barrington Street  
Suite 2085  
PO Box 442  
Halifax, NS B3J 2P8

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Tel 424-3960  
Fax: 424-6925

Receive Date: 2006/08/11

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Directory:	Alton Approvals Status May 25, 2015_draft	File Extension:	doc
File Name:	Other	File Size:	46,592
Document Type (Upload):			
Directory:	Alton Gas SF Follow up September 28, 2015	File Extension:	docx
File Name:	Other	File Size:	33,451
Document Type (Upload):			
Directory:	Alton Gas Pipeline EA Approval follow-up September 2	File Extension:	docx
File Name:	Other	File Size:	35,209
Document Type (Upload):			

# Alton Approval Status

## Alton Natural Gas Storage Project

Updated May 25, 2015

Department	Type of Approval/Permit/Advice	Status
Nova Scotia Environment	Environmental Assessment Approval – Alton Natural Gas Storage Project	Approved December 18, 2007
	Temporary Watercourse Alteration Approval	Approved April 3, 2008 Approval # 2008-061382
	Approval to Construct and Operate Brine Storage Pond (Phase 1)	Approved April 3, 2008 Approval # 2008-061384
	Approval to Construct & Operate Brine Storage Pond and Associated Works Phase II: site preparation and well-drilling	Approved June 12, 2008 Approval # 2008-061384A01
	Watercourse Alteration Approval to Construct – Pipe Culvert	Approved June 10, 2009 Approval # 2008-062749
	Environmental Assessment Approval – Alton Natural Gas Pipeline Project	Approved May 21, 2013 Not planned for the near future
	Water Course Alteration Approval – Temporary Crossings	Application submitted March 2014. Approved May 1, 2014 Approval # 2014-088795
	Watercourse Alteration Approval for Waterpipeline Crossing	Approved June 6, 2014 Approval # 2014-089061
	Amendment to Industrial Approval Application Phase III - Construction of Freshwater/Brine Storage Pond .	Application submitted April 2014  Approved August 8, 2014 Approval # 2008-061384-A02 Approval is only for the construction of the brine storage pond.
	Amendment to the Industrial Approval for the Brine Storage Pond will be required for the operation of the brine pond (to allow brine water to be released into the Shubenacadie River)	NSE received an application from the company seeking an Industrial Approval to begin operating the brine storage ponds (October 14, 2014) and it is under review. This will be essentially an Approval to Operate and it will not be issued until the requirements of all agencies involved have been met.

Office of Aboriginal Affairs	Procedure for communication with the Mi'kmaq of Nova Scotia. Consultation with the Assembly of Nova Scotia Mi'kmaq Chiefs and separate Consultation with Sipekne'katik First Nation.	Alton submitted a draft First Nations Engagement Strategy to NSE on October 5, 2014 and a revised First Nations Engagement Strategy to OAA on October 23, 2014. OAA advised NSE the Strategy is acceptable on December 12, 2014. Upon request, the Strategy was shared with the Assembly on December 8, 2014.  Consultation on outstanding permits and authorizations is continuing with the Mi'kmaq.
Communities Culture and Heritage (CCH)	To review archaeological reports.	CCH received the requested archaeological reports and reviewed them. The permitted archaeologist was notified in writing (June 26 <sup>th</sup> 2014) that revisions are required for report A2011NS33. CCH is still waiting for the requested revisions necessary for CCH approval and sign off on archaeology recommendations. CCH has issued the permit (A2014NS045) for the archaeological monitoring for the dyke and mixing channel areas.  Early Jan. 2015 CCH received application for new arch. permit.
Department of Natural Resources	Lease of submerged Crown land.  Easement required for gas pipeline.	Lease template sent to Alton. May 19, 2015 Alton submitted the Crown Land Lease Application to DNR.  Easement application June 11, 2014
Department of Agriculture	Providing a variance for construction on the incorporated Fort Ellis Marsh required under the Agricultural Marshland Conservation Act and entering into	A letter was sent to Alton Gas on November 3, 2014, from the Minister of Agriculture, indicating that the agreement will not be signed until meaningful Crown

	an agreement to construct on Crown Land as the Dyke is owned by NSDA.	<p>consultation with the Mi'kmaq proceeds and other necessary approvals (DNR authority for coastal lands) are in place. The letter also required the company to repair the breached dyke located on Crown Marshlands. The repair agreement was signed on January 20, 2015. The repair work was not completed this winter pending further consultation with the Mi'kmaq.</p> <p>Alton has completed the new dyke parallel to the existing dyke which lessens the impact of any failure as a result of the breach. The risk of dyke failure has lessened now that spring ice and snow melt has occurred. There is no urgency to complete repairs at this time until it is determined whether construction will resume this summer.</p> <p>A revised construction agreement is being prepared in anticipation of work at the site.</p>
Fisheries Canada	DFO to provide advice.	On Aug 1, 2014 DFO reviewed Alton Estuary Monitoring Plan. Recommend a study be completed to determine median toxicity threshold of the brine water on egg, larvae and juvenile Stripped bass survival. This study can be completed prior to operation or during. Changes to the toxicity study are currently under review.
Department of Energy	Hydrocarbon Storage Area Lease.	On June 2, 2009 this lease was granted.
Nova Scotia Utility and Review Board	Approval for construction of storage caverns.	On September 4, 2013 approval issued for construction of storage cavern.
Various	Permits for natural gas surface facilities and pipeline will require	Not yet applied for these permits.

	additional permits.	
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## Environmental Assessment Approval

Approval Date: *Original Dated December 18, 2007*

### Alton Natural Gas Storage Project

Alton Natural Gas Storage LP, Proponent  
Colchester County, Nova Scotia

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### 2015 Follow-up September 28, 2015

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Alton Natural Gas Storage (the "Undertaking"), proposed by Alton Natural Gas Storage LP (the "Proponent"), in Colchester County, Nova Scotia is approved pursuant to Section 13(1)(b) of the *Environmental Assessment Regulations*. This Approval is subject to the following conditions and obtaining all other necessary approvals, permits or authorizations required by municipal, provincial and federal acts, regulations, by-laws, guidelines, policies or standards before commencing work on the Undertaking. It is the responsibility of the Proponent to ensure that all such approvals, permits or authorizations are obtained before commencing work on the Undertaking.

This Environmental Assessment Approval is based upon the review of the conceptual design, environmental baseline information, impact predictions, and mitigation presented in the Registration Information.

1.0 General Approval	Completed/Comments
1.1 The Environmental Assessment Approval for the project is limited to the project as described in the registration document. Any proposal by the Proponent for expansion, modification or relocation of any aspect of the project from that proposed in the registration document must be submitted to the Environmental Assessment Branch for review and may require an environmental assessment.	Ongoing condition for life of project.
1.2 The Proponent must, within two years of the date of issuance of this approval, commence work on the undertaking unless granted a written extension by the Minister.	Work commenced 2008 access roads developed. RoW water pipeline cleared April, 2008.  Condition met.



<p><b>1.3 The Proponent must not transfer, sell, lease, assign or otherwise dispose of this approval without the written consent of the Minister. The sale of a controlling interest of a business or a transfer of an approval from a parent company to a subsidiary or an affiliate is deemed to be a transfer requiring consent.</b></p>	<p><b>Ongoing</b> condition for life of project.</p>
<p><b>1.4 The Proponent must implement all mitigation and commitments in the Registration Document, unless approved otherwise by Nova Scotia Environment</b></p>	<p><b>Ongoing</b> condition for life of project.</p>
<p><b>2.0 Fish &amp; Fish Habitat</b></p>	
<p><b>2.1 The proponent, as part of the application for Part V Approval under the Environment Act, must provide for review the following monitoring programs and plans developed in consultation with the Department of Fisheries &amp; Oceans (DFO). Based on the results of the monitoring programs, the proponent must make necessary modifications to mitigation plans and/or operations to prevent continues unacceptable environmental effects to the satisfaction of NSEL and DFO.</b></p>	<p>On August 1, 2014, DFO accepted Alton's Monitoring Plan submitted on June 18, 2014. DFO recommended a study be completed to determine median toxicity threshold of the brine water on egg, larvae and juvenile Striped bass survival.</p> <p>The toxicity study has not yet been conducted. DFO and the proponent decided that in order to get the most accurate results, it would need to be conducted after the brining starts. Conducting the study after brining begins will allow the researches to use the actual brine that will be released in the river as opposed to brine created in the lab from the salt cores and Shubenacadie river water. Once brining is underway the toxicology study will be completed in the months of May, June and July when striped bass eggs, larvae and juveniles are available. The results of the toxicity study, including possible additional mitigation measures and design revisions are to be implemented as per the Alton Natural Gas Estuary Monitoring Plan and will be provided to DFO for review once available.</p>
<p><b>a) An Effects Monitoring Plan including parameters such as frequency and duration. The plan must evaluate potential impacts of</b></p>	<p>As above accepted by DFO.</p> <p><b>Condition met.</b></p>

<b>sedimentation, salinity and flow alterations on aquatic organisms and include an impact prediction.</b>	
<b>b) A program to monitor discharge salinity levels into the estuary to ensure no negative impacts to fish species result. This program should be developed in consultation with Environment Canada (EC).</b>	As above accepted by DFO.  <b>Condition met.</b>
<b>c) A plan to gather baseline information on water temperature and the presence of Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae during one spawning season prior to the commencement of solution mining.</b>	As above accepted by DFO.  <b>Condition met.</b>
<b>d) A long term monitoring program for Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae. This plan must identify operational responses to unexpected impacts to populations.</b>	As above accepted by DFO.  <b>Condition met.</b>
<b>e) An ongoing monitoring program of fish screens or passive water intakes to determine if impingement is occurring.</b>	As above accepted by DFO.  <b>Condition met.</b>
<b>2.2 The proponent must maintain a minimum of 30 meter vegetated buffer between all watercourses and wetlands.</b>	An inspection took place on June 3, 2015 to determine whether the 30 meter buffer has been maintained. Due to high rainfall, the inspector was unable to determine conclusively that the proponent was able to meet the buffer. The inspector is scheduling an inspection at a later date when the ground has dried.
<b>3.0 Archaeological &amp; Heritage Resources</b>	
<b>3.1 The proponent must develop a procedure so that any issues or concerns raised by potentially affected First Nation and Aboriginal communities, particularly related to environmental effects, can be directed to the Proponent and resolved in a timely manner. This procedure must include contact information, documentation and a resolution process.</b>	Alton submitted revised plan. Accepted.  <b>Condition met.</b>

<p><b>3.2 The proponent must develop and implement an Archaeological Contingency Plan that includes:</b></p>	<p>CCH has issued the permit (A2014NS045) for the archaeological monitoring for the dyke and mixing channel areas.</p> <p>Provided contingency plan in the construction EPP.</p> <p><b>Condition met.</b></p>
<p><b>a) Procedures for immediate work stoppage and conservation of resources, should archaeological resources be discovered.</b></p>	<p>Contingency procedures provided in EPP- <b>condition met.</b></p>
<p><b>b) Details of worker awareness training to be delivered to employees, which will address archaeological resources and relevant procedures.</b></p>	<p>Contingency procedures provided in EPP- <b>condition met.</b></p>
<p><b>c) Plans for shovel testing to determine the presence of archaeological resources in the high potential areas identified.</b></p>	<p>Done.</p> <p><b>Condition met.</b></p>
<p><b>d) Plans to have professional archaeologist, approved by Nova Scotia Tourism, Culture &amp; Heritage (NSTC&amp;H), monitor any work that would impact the dykes in case any original dyke work is encountered.</b></p>	<p>Unauthorised work on dyke did not have archaeologist on site. CCH sent letter Nov. 19 to company. CCH ready to issue 2015 permit.</p>
<p><b>3.3 The Proponent must cease work and contact the Director, Heritage Division, Nova Scotia Department of Tourism, Culture and Heritage, the Executive Director, Confederacy of Mainland Mi'kmaq and the Executive Director, Union of Nova Scotia Indians immediately upon discovery of an archaeological site or artifact unearthed during any phase of the proposed project.</b></p>	<p><b>Ongoing condition.</b></p>
<p><b>4.0 Land Use &amp; Public Involvement</b></p>	
<p><b>4.1 The proponent, as part of the application for Part V Approval under the Environment Act, the Proponent must provide for review and approval, a detailed of the Environmental Management Plan (EMP) including the following. Based on the results</b></p>	<p>EMP Submitted October 14, 2014; see notes on a-d below</p>

of the monitoring programs, the proponent must make necessary modifications to mitigation plans and/or operations to prevent continued unacceptable environmental effects to the satisfaction of NSEL.	
a) An Environmental Protection Plan (EPP), that includes procedures to address soil management issues including mitigative strategies for reducing the risk of sedimentation and erosion, for all aspects of all phases of the project.	<p>Phase 1 EPP submitted May 25, 2008 – Approved under 2008-061384  Phase II EPP submitted July 16, 2008 – Approved under 2008-061384-A01  Phase III EPP submitted April 7; 2014; EPP submitted Oct 14, 2014.</p> <p><b><u>Reviewed and condition met</u></b></p>
b) A dust management plan.	<p>Oct 14, 2014 EPP page 22 Section 4.3.</p> <p><b>Reviewed and condition met</b></p>
c) A Waste Management Plan (WMP).	<p>Oct 14, 2014 EPP page 25 Section 4.6.</p> <p><b>Reviewed and condition met</b></p>
d) An Issues Resolution System including procedures to; deal with project related complaints/issues from landowners and/or the public, to ensure complaints are recorded, tracked and resolved in a timely manner.	<p>April 7, 2014 Phase III EPP page 4; Oct 14, 2014 EPP page 12 section 2.3.2.</p> <p><b>Reviewed and condition met</b></p>
4.2 The proponent must consult with Transport Canada to determine if an application under the Navigable Waters Protection Act is required and if so, obtain such approval before commencement of site preparation and construction activities.	<p>Alton has informed NSE that no TC approval required. Email dated May 28, 2014.</p> <p><b>Condition met.</b></p>
4.3The proponent must obtain from NSDNR, any required permits for project activities pursuant to the Beaches Act and the Crown Lands Act, prior to the commencement of site preparation and construction activities.	<p>Department of Natural Resources is currently reviewing the proponent's application for the Submerged Crown Land Lease.</p> <p>Agriculture and Alton working on agreement for construction and ownership of new dykes as well as receiving approvals and zoning from local marsh body and municipality. Agriculture has</p>

	<p>requested in a letter dated Nov 5, 2014 that they repair the partial breaches in the dyke. Alton has completed the new dyke parallel to the existing dyke which lessens the impact of any failure as a result of the breach. The risk of dyke failure has lessened now that spring ice and snow melt has occurred. There is no urgency to complete repairs at this time until it is determined whether construction will resume this summer.</p> <p>A revised construction agreement is being prepared in anticipation of work at the site.</p>
<b>5.0 Flora &amp; Fauna</b>	
<b>5.1 In areas where pipeline route alterations are considered, supplemental rare plant surveys must be conducted along the new route to determine if rare plants or other sensitive habitats are present. These surveys must be provided and conducted to the satisfaction of NSDNR.</b>	<p>DNR fine with plant surveys.</p> <p><b>Condition met.</b></p>
<b>5.2 The proponent must implement standard mitigative measures to minimize the environmental effects of the project on plant communities including the use of native plants and/or seed mixtures free of noxious weeds and known invasive species. The proponent must use industry standards to avoid the introduction of invasive species.</b>	Ongoing
<b>5.3 If the undisturbed retrorse sedge habitat becomes part of the new RoW, the proponent must cordon off the area to prevent the movement of project related equipment through the habitat.</b>	<p>DNR fine.</p> <p><b>Condition met.</b></p>
<b>5.4 Clearing and grubbing must be conducted outside of the breeding season for most bird species (May 1 - August 31).</b>	Ongoing – condition amended to allow grubbing during this time.
<b>5.5 The proponent must not conduct project activities within 200 m of the Osprey nest identified in the field surveys during the period from April</b>	<p>DNR fine.</p> <p><b>Condition met.</b></p>

1 to July 30.	
5.6 The proponent must conduct a field survey prior to the commencement of construction activities to determine the size and location of the Great Blue Heron colony. Information from the survey must be sent to the Canadian Wildlife Service (CWS). The proponent must not allow project activities within a 400 m buffer zone of the rookeries from April through mid-August, any activities deemed to have a high disturbance factor within one-kilometer of the rookeries through the same period, or any activities requiring the removal of trees within the 400m buffer zone at any time of the year.	Alton has provided information on what may have disturbed the Great Blue Heron rookery – DNR attribute this to cumulative effects in the area. Sept.15, 2014 phone conversation with DNR. <b>Condition met.</b>
6.0 Groundwater	
6.1 The proponent, as part of the application for Part V approval under the Environment Act, must provide for review and approval:	
a) A groundwater-monitoring program including location of monitoring wells and parameters. This program must be designed to evaluate potential impacts to both groundwater levels and groundwater quality. As a minimum, one monitoring well should be up gradient and four should be down gradient of the caverns. Wells should also be constructed down gradient from the pipeline, especially in areas where the pipeline will be closest to houses. Monitoring should include quarterly water levels and quality measurements; at a minimum one-year of baseline measurements should be collected. Based on the results of the monitoring programs, the proponent must make necessary modifications to	Reviewed by NSE hydrogeologist. <b>Condition met Nov 24, 2014</b>

mitigation plans and/or operations to prevent continues unacceptable environmental effects to the satisfaction of NSEL.	
b) Details of a well survey plan of potentially at risk wells that meet NSEL standards, including water quality testing and yield determination tests.	Reviewed by NSE hydrogeologist. <b>Condition met Sept 29, 2014</b>
<b>7.0 Contingency Planning</b>	
<b>7.1 The proponent, as part of the application for Part V approval under the Environment Act, must provide for review and approval:</b>	
a) A Spill Management Plan including: measures for prevention; procedures for clean-up of any sized spill; accounting of who would be responsible for cleanup and what response and containment equipment would be available; measures for keeping birds away from a spill, and for dealing with accidents where birds are oiled and/or sensitive habitats are contaminated; reference to provincial emergency spill regulations; procedures for the storage and disposal of lubricants, petroleum products and waste oils; and reference to provincial regulations pertaining to this storage and disposal, and number and location of on site-personnel spill kits.	An Emergency Response and Contingency Plan (dated May 7, 2015) and a letter dated May 7th, 2015 was submitted to NSE on May 11, 2015. The information was reviewed and was determined to be incomplete. An email was sent to the proponent requesting the missing information. Additional information was submitted on May 21, 2015 and has been determined to be complete. <b>Condition met.</b>
b) An Emergency Response and Contingency Plan consistent in format and content with NSEL's Contingency Planning Guidelines, including:	The Emergency Response and Contingency Plan was submitted May 11, 2015 – <b>condition met</b>
i) safety features incorporated in project design,	<b>As above</b>
ii) post accidental monitoring,	<b>As above</b>

iii) system shut down procedures,	As above
iv) notification procedures,	As above
v) containment, decontamination and remediation standards to be met in clean-up,	As above
vi) training and exercise drills including Workplace Hazardous Materials Information System (WHMIS) training,	As above
vii) comprehensive inspection and maintenance procedures, regulatory compliance standards, reference to CSA Standard Z341 and the CAN/CSA Standard Z731-03 Emergency Preparedness and Response Standard, and	As above
viii) procedures to address tourism operations on the Shubenacadie river, Cobequid and Minas Basins.	Email Dec 19, 2014 TCH. <b>Condition met.</b>
c) Details of the Environmental, Health and Safety (EHS) system.	Information submitted May 11, 2015 - <b>condition met.</b>
d) Details for the assessment of other water uses or withdrawals, in or near the project area that could be affected by project related accidents.	Information submitted May 11, 2015 – <b>condition met.</b>
7.2 All monitoring programs must be resubmitted over the lifetime of the project, at a schedule established by NSEL, and revised as determined by NSEL.	Ongoing



## Environmental Assessment Approval

Approval Date: *Original Dated May 21, 2013*

### Alton Natural Gas Storage Project

Alton Natural Gas Storage LP, Proponent  
Colchester County, Nova Scotia

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**2015 Follow-up  
September 29, 2015**

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The Alton Natural Gas Pipeline Project (the "Undertaking"), proposed by Alton Natural Gas Storage LP (the "Approval Holder") near Alton, Colchester County, Nova Scotia is approved pursuant to Section 40 of the *Environment Act* and Section 18(a) of the *Environmental Assessment Regulations*. This Approval is subject to the following conditions and obtaining all other necessary approvals, permits or authorizations required by municipal, provincial and federal acts, regulations and by-laws before commencing work on the Undertaking. It is the responsibility of the Approval Holder to ensure that all such approvals, permits or authorizations are obtained before commencing work on the Undertaking.

This Environmental Assessment Approval is based upon the review of the conceptual design, environmental baseline information, impact predictions, and mitigation presented in the Registration Document and Focus Report.

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#### Terms and Conditions for Environmental Assessment Approval

1.0 General Approval	Status/Comments
1.1 The Environmental Assessment Approval for the Undertaking is limited to the Undertaking as described in the Environmental Assessment Registration Document and Focus Report.	Ongoing.
1.2 Expansion, modification or relocation of any aspect of the Undertaking from that proposed in the registration information must be submitted to the Environmental Assessment Branch for review and may require an environmental	<b>Ongoing</b>  Following a review of the Alton Natural Gas Pipeline Project Proposed Re-Alignment (January 7, 2015), it has been determined that no further environmental assessment (EA) is required, with the proviso that an archaeological impact assessment, as well as physical assessments for wetlands and watercourses are completed for the new alignment.

assessment (EA).	<p>Alton has planned for fieldwork in the summer 2015:</p> <ul style="list-style-type: none"> <li>• “Option A” Re-Alignment Field Truthing <ul style="list-style-type: none"> <li>○ 2-3 Days (July)</li> </ul> </li> <li>• Wetland Baseline Monitoring and Functional Assessment <ul style="list-style-type: none"> <li>○ 5 days (set up in June, baseline in August)</li> </ul> </li> <li>• Groundwater baseline <ul style="list-style-type: none"> <li>○ 2 days (June)</li> </ul> </li> <li>• Archaeological impact study <ul style="list-style-type: none"> <li>○ 2 days (June-July)</li> </ul> </li> </ul>
1.3 The Approval Holder must, within two years of the date of issuance of this Approval, commence work on the Undertaking unless granted a written extension by the Minister.	<p>Work has not yet begun on the pipeline.</p> <p><b>Extension granted to May 21, 2017</b></p> <p>“commence work” means, with respect to an undertaking, to begin construction or site preparation activity for an undertaking or any part of an undertaking;</p>
1.4 The Approval Holder must not transfer, sell, lease, assign or otherwise dispose of this Approval without the written consent of the Minister. The sale of a controlling interest of a business or a transfer of an approval from a parent company to a subsidiary or an affiliate is deemed to be a transfer requiring consent.	<p>A transfer has previously occurred in December 2013. During this transfer, all of the equity interests of Veresen Energy Infrastructure in both the limited partner and the general partner was acquired by AltaGas Natural Gas Storage Ltd.</p> <p>This condition is <b>on-going</b></p>
1.5 The Approval Holder must implement all mitigation and commitments in the Registration Document and Focus Report, unless approved otherwise by Nova Scotia Environment (NSE).	<b>Ongoing</b>
1.6 The Approval Holder must provide a report to NSE's Environmental Assessment Branch one year following construction of the Undertaking. The report must include, but not be limited to, site development, mitigation plans, monitoring	One year after construction.

results, and compliance with the Terms and Conditions of the EA Approval.	
<b>2.0 Project Location and Route Selection</b> 2.1 Approval is based on the "Original Alignment" of the pipeline as described in the EA Registration Document and Focus Report.	Ongoing.
<b>3.0 Project Infrastructure and Activities</b> 3.1 Prior to clearing and/or construction, the Approval Holder must submit the Environmental Management Plan (EMP) for review by Department of Fisheries and Oceans (DFO) and review and approval by NSE.	Ongoing.
3.2 The Approval Holder must update and revise the EMP at the request of NSE, at any time during construction or operation of the Undertaking.	Ongoing.
3.3 All revisions to the EMP must be forwarded to NSE for review and approval.	Ongoing.
3.4 The Approval Holder must, in consultation with NSE and Fisheries and Oceans Canada, develop a post construction monitoring and reporting schedule to be included in the EMP.	Ongoing.
3.5 The Approval Holder must distribute the EMP and all subsequent revisions to NSE and other regulatory agencies.	Ongoing.
<b>4.0 Proposed Wilderness Areas Lands</b>	To date, there have been only very preliminary discussions between the proponent and NSE regarding the compensation

4.1 Within four years of the date of this EA Approval, the Approval Holder must develop and implement a compensation plan that has been reviewed and approved by NSE, for impacts on the Stewiacke River Wilderness Area. This plan shall include, but may not be limited to, the securement of conservation land in the vicinity of the Undertaking for statutory protection by the province.	plan.
4.2 Prior to any clearing and /or construction in a proposed wilderness area the Approval Holder must provide notification to NSE.	No clearing or construction in a proposed wilderness area has commenced as of yet.
4.3 The Approval Holder must ensure that any work within a designated wilderness area is approved by the Minister of Environment as required by the <i>Wilderness Areas Protection Act</i> .	No work within a designated wilderness area has commenced as of yet.
<b>5.0 Aquatic Habitat/ Surface Water/ Watercourse Crossings</b> 5.1 The Approval Holder must not undertake any "wet" watercourse crossing, unless otherwise approved by NSE.	Ongoing.
5.2 The Approval Holder must obtain an approval from NSE for the construction of watercourse crossings, as specified in the <i>Activities Designation Regulations</i> .	Five watercourses will need to be crossed for the pipeline.  A watercourse alteration approval was issued June 6, 2014 for crossings along the water pipeline.
5.3 Any environmental impacts on the public water supply for the Town of Stewiacke must be corrected by the Approval Holder to the satisfaction of NSE.	Ongoing.

<p>5.4 Prior to clearing and/or construction, the Approval Holder must provide an approved security that is satisfactory to NSE. This security is to cover an alternate temporary and/or permanent drinking water supply in the event that the Undertaking impacts the public water supply.</p>	<p>Josh Blakeney working on this. NSE waiting for help from Bruce Langille with security for gas pipeline in Protected Water Area.</p>
<p><b>6.0 Groundwater</b> 6.1 Prior to any blasting, the Approval Holder must conduct a pre-blast survey for water wells within 800 m of the point of blast. The survey must be conducted in accordance with the NSE "Procedure for Conducting a Pre-Blast Survey". Any water well impacts from the blasting must be corrected by the Approval Holder to the satisfaction of NSE.</p>	<p>The pre-blast survey has not yet been received by NSE.</p>
<p><b>7.0 Flora and Fauna</b> 7.1 Prior to clearing and/or construction, the Approval Holder must provide DNR's Regional Services and Wildlife Division staff with digital way point files revealing precise locations for all "RED", "YELLOW" and "UNDETERMINED" listed species based on actual field inventories for rare/endangered vascular, non-vascular plants, lichen, birds, mammals, and reptiles within the affected corridor. The Approval Holder must report to NSE that the files have been provided to DNR. Final location of the pipeline must be determined in consultation with DNR's Wildlife Division, pending review of inventory results.</p>	<p>DNR's Regional Services and Wildlife Division staff have not yet received the digital way point files</p>
<p>7.2 Site preparations that include deforestation, clearing</p>	<p>Ongoing.</p>

and grubbing must be undertaken between September 1 <sup>st</sup> and March 30 <sup>th</sup> in order to minimize impacts on breeding birds that may include endangered and threatened species listed under the <i>Species at Risk Act</i> and/or the <i>Nova Scotia Endangered Species Act</i> , unless otherwise approved by NSE.	
7.3 If site preparation activities occur between mid-July and August 31 <sup>st</sup> , the Approval Holder must prepare and implement a monitoring and mitigation plan for breeding activity (i.e. nesting) pursuant to the <i>Migratory Bird Convention Act</i> , in consultation with DNR and the Canadian Wildlife Service.	Further details will be included in the project EPP.  Ongoing.
7.4 The Approval Holder must use natural species to re-vegetate exposed soil in forest and riparian zones.	Not applicable at this time.
7.5 The Approval Holder must contact DNR prior to any site investigations, construction, or project related access planned on Crown lands.	DNR received an application for a Crown Land Easement on September 5, 2014. This application is currently under review.  There have been some changes to the Crown land in the area. As a result of a purchase of lands by the Province from Northern Pulp in 2010, nearly 3900 hectares of former Northern Pulp land in the St. Andrews River area became provincial Crown land. This land was included among the areas put forward for public review in 2011 as lands being considered for protection.  Subsequently, a portion of this area was proposed not to be protected in favour of a nearby area currently privately owned (Our Parks and Protected Areas – A Plan for Nova Scotia, Province of Nova Scotia, 2013). Protection of this substitute area depends on provincial acquisition of the land, possibly through a trade. Whether this occurs or not, and whether all or only a portion of the area currently planned for protection is ultimately protected, there will have been a net increase of 3900 ha of Crown land in this area since 2009.
7.6 Prior to construction, the Approval Holder must undertake	DNR staff have not yet been provided with information as to whether wood turtle nesting surveys have been conducted

wood turtle nesting surveys and all nesting areas must be avoided. All wood turtles found or observed must be reported immediately to DNR's Wildlife Division and the Regional Biologist.	
<b>8.0 Wetlands</b> 8.1 The Approval Holder must obtain an approval from NSE for the wetland alterations, as specified in the Activities Designation Regulations.	The approval holder has not yet obtained approvals for wetland alterations.
8.2 The Approval Holder must provide GPS boundary coordinates and shape files of all wetlands delineated for the Undertaking to NSE.	The approval holder has not yet provided GPS boundary coordinates for delineated wetlands.
<b>9.0 Air Quality and Noise</b> 9.1 The Approval Holder must participate in future air shed management programs as required by NSE.	NSE has not required the approval holder participate in programs regarding air shed management.
9.2 The Approval Holder must not burn any materials generated as a result of construction activities.	No construction waste has been generated yet and that this condition will be ongoing.
9.3 The Approval Holder must conduct air quality monitoring or dust monitoring at the request of NSE.	NSE has not requested the approval holder conduct air quality or dust monitoring.
<b>10.0 Public Consultation</b> 10.1 The Approval Holder must form, at the request of NSE, a Community Liaison Committee (CLC) for both the Alton Natural Gas Storage Facility and this Undertaking, in consultation with NSE and with municipal and community representatives. The NSE <i>Guidelines for the Formation of a Community Liaison Committee</i> shall be used for the guidance of the Approval Holder and community.	NSE has not yet required the approval holder to form a CLC.

<p>10.2 The Approval Holder must provide, for review and approval by NSE, procedures for hearing and responding to community concerns raised during the construction and operation of the Undertaking.</p>	<p>NSE does not yet have this document.</p>
<p><b>11.0 Nova Scotia Mi'kmaq</b> 11.1 The Approval Holder must develop and implement a Mi'kmaq Communication Plan for the Undertaking, which will include a process for communicating project details and seeking input from the Mi'kmaq community.</p>	<p>This plan has been created.</p> <p>Condition met.</p>
<p>11.2 The Approval Holder must solicit CLC membership from the Mi'kmaq community if a CLC is requested to be formed by NSE.</p>	<p>NSE has not yet required the formation of a CLC.</p>
<p><b>12.0 Archaeological and Heritage Resources</b> 12.1 The Approval Holder must submit reports for archaeological resource impact assessments conducted for this Undertaking, to Nova Scotia Department of Communities, Culture and Heritage for review and approval. Based on the conclusions and recommendations of this review, further studies and/or mitigation may be required at the request of NSE.</p>	<p>Relevant Heritage Research Permits and related work are as follows:</p> <ul style="list-style-type: none"> <li>•A2006NS58 (Background research and pedestrian survey)</li> <li>•EA 07-07-06 (recommended shovel testing of high potential areas and monitoring of dyke work)</li> <li>•A2008NS66 (pedestrian survey of Shubenacadie river to riverside road; shovel testing – negative)</li> <li>•A2011NS33 (Pedestrian survey of pipeline ROW; shovel testing high potential areas – negative)</li> <li>•A2014NS045 (permit for monitoring of mixing channel / dyke area)</li> </ul> <p>The reports A2006NS58; A2008NS66; and a revised final version of A2011NS33 have all been reviewed and approved by CCH. A report for A2014NS045 is still outstanding from the archaeologist.</p> <p>The archaeologist was on site on July 9-11; August 5, 11, 22-23, 25th and, Sept 6, 2014. It was agreed at the outset of the project that archaeological monitoring would not be required full time for excavations outside of the existing dyke, but would be required full time for the dyke excavation.</p> <p>No work on the dyke has taken place since November 19, 2014. CCH has an application from the archaeologist for 2015 monitoring work and has reviewed it but sign off will not occur</p>



	until consultation discussions have reached a satisfactory point.
12.2 The Approval Holder must cease work and contact the Special Places Coordinator, Nova Scotia Department of Communities, Culture and Heritage immediately upon discovery of an archaeological site or artifact unearthed during any phase of the proposed Undertaking. If the find is of certain or suspected Mi'kmaq origin, the Approval Holder must also contact the Executive Director of the KMKNO.	Ongoing.
<b>13.0 Contingency Planning</b> 13.1 Prior to clearing and/or construction the Approval Holder must submit the Emergency Response and Contingency Plan to NSE for review and approval.	The approval holder has not yet submitted the Emergency Response and Contingency Plan to NSE
13.2 The Approval Holder must contact NSE immediately upon discovery of any contaminated soil.	Ongoing.
<b>14.0 Decommissioning and Site Reclamation</b> 14.1 The Approval Holder must provide NSE with a finalized abandonment plan, for review and approval, six months prior to the permanent shut down of the Undertaking.	Ongoing.

Title: PATH File No:	Shubenacadie River - water withdrawal and effluent release and natural gas storage 06-HMAR-MA7-00182
	Habitat File No: 06-W7-182

Activity:	Correspondence - Do not go to Macro Access Screen	Action ID No.: 97
To	MacNeil, Jack	Action Date: December 04, 2015
From:	MacPhail, Helen	Document Date: November 09, 2015

Description:

**From:** MacPhail, Helen [mailto:Helen.MacPhail@novascotia.ca]  
**Sent:** 2015-December-04 1:27 PM  
**To:** Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Weseloh McKeane, Sean; Dera, Beata E; Skinner, Bradley; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; Jacobi, Carol; McLean, Mark G; Bird, Michael W; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; Denis, Alex X; Jollymore, Mary Anna T; Huston, Justin E  
**Cc:** Wright, Patricia E; Sanford, Steve L  
**Subject:** Alton Gas Meeting - December 9, 2015

Hello All,

This email is just to confirm that we will be having a meeting next Wednesday, December 9, at 1.00 pm in 18C Barrington Tower. I've attached documents showing the status of the EA conditions, as well as a general approval status document, for your review and comment. The company is meeting with NSE Regional Office staff on Tuesday, so I would like to have updated versions of these by Monday, if possible. Also, if you could let me know if you have anything to share with the group ahead of the meeting that would be appreciated.

I look forward to seeing you next week.

Regards,

*Helen MacPhail*

Environmental Assessment Supervisor  
**Environmental Assessment Branch**

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Effective Date: 2006/08/11

Nova Scotia Environment  
1903 Barrington Street  
Suite 2085  
PO Box 442  
Halifax, NS B3J 2P8  
Tel 424-3960  
Fax: 424-6925

Action: Information Received  
Effective Date: Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs): 0.00  
Authorization Rationale:

Directory:			
File Name:	Alton Gas SF Follow up December 4, 2015	File Extension:	docx
Document Type (Upload):	Other	File Size:	33,025
Directory:			
File Name:	Alton Gas Pipeline EA Approval follow-up Dec 4, 2014	File Extension:	docx
Document Type (Upload):	Other	File Size:	34,407
Directory:			
File Name:	Alton Approvals Status Oct. 8, 2015_draft	File Extension:	doc
Document Type (Upload):	Other	File Size:	46,592

## Environmental Assessment Approval

Approval Date: *Original Dated December 18, 2007*

### Alton Natural Gas Storage Project

Alton Natural Gas Storage LP, Proponent  
Colchester County, Nova Scotia

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#### 2015 Follow-up December 4, 2015

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Alton Natural Gas Storage (the "Undertaking"), proposed by Alton Natural Gas Storage LP (the "Proponent"), in Colchester County, Nova Scotia is approved pursuant to Section 13(1)(b) of the *Environmental Assessment Regulations*. This Approval is subject to the following conditions and obtaining all other necessary approvals, permits or authorizations required by municipal, provincial and federal acts, regulations, by-laws, guidelines, policies or standards before commencing work on the Undertaking. It is the responsibility of the Proponent to ensure that all such approvals, permits or authorizations are obtained before commencing work on the Undertaking.

This Environmental Assessment Approval is based upon the review of the conceptual design, environmental baseline information, impact predictions, and mitigation presented in the Registration Information.

1.0 General Approval	Completed/Comments
1.1 The Environmental Assessment Approval for the project is limited to the project as described in the registration document. Any proposal by the Proponent for expansion, modification or relocation of any aspect of the project from that proposed in the registration document must be submitted to the Environmental Assessment Branch for review and may require an environmental assessment.	Ongoing condition for life of project.
1.2 The Proponent must, within two years of the date of issuance of this approval, commence work on the undertaking unless granted a written extension by the Minister.	Work commenced 2008 access roads developed. RoW water pipeline cleared April, 2008.  Condition met.

<p><b>1.3 The Proponent must not transfer, sell, lease, assign or otherwise dispose of this approval without the written consent of the Minister. The sale of a controlling interest of a business or a transfer of an approval from a parent company to a subsidiary or an affiliate is deemed to be a transfer requiring consent.</b></p>	<p><b>Ongoing</b> condition for life of project.</p>
<p><b>1.4 The Proponent must implement all mitigation and commitments in the Registration Document, unless approved otherwise by Nova Scotia Environment</b></p>	<p><b>Ongoing</b> condition for life of project.</p>
<p><b>2.0 Fish &amp; Fish Habitat</b></p>	
<p><b>2.1 The proponent, as part of the application for Part V Approval under the Environment Act, must provide for review the following monitoring programs and plans developed in consultation with the Department of Fisheries &amp; Oceans (DFO). Based on the results of the monitoring programs, the proponent must make necessary modifications to mitigation plans and/or operations to prevent continues unacceptable environmental effects to the satisfaction of NSEL and DFO.</b></p>	<p>On August 1, 2014, DFO accepted Alton's Monitoring Plan submitted on June 18, 2014. DFO recommended a study be completed to determine median toxicity threshold of the brine water on egg, larvae and juvenile Striped bass survival.</p> <p>The toxicity study has not yet been conducted. DFO and the proponent decided that in order to get the most accurate results, it would need to be conducted after the brining starts. Conducting the study after brining begins will allow the researches to use the actual brine that will be released in the river as opposed to brine created in the lab from the salt cores and Shubenacadie river water. Once brining is underway the toxicology study will be completed in the months or May, June and July when striped bass eggs, larvae and juveniles are available. The results of the toxicity study, including possible additional mitigation measures and design revisions are to be implemented as per the Alton Natural Gas Estuary Monitoring Plan and will be provided to DFO for review once available.</p>
<p><b>a) An Effects Monitoring Plan including parameters such as frequency and duration. The plan must evaluate potential impacts of</b></p>	

<b>sedimentation, salinity and flow alterations on aquatic organisms and include an impact prediction.</b>	
<b>b) A program to monitor discharge salinity levels into the estuary to ensure no negative impacts to fish species result. This program should be developed in consultation with Environment Canada (EC).</b>	
<b>c) A plan to gather baseline information on water temperature and the presence of Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae during one spawning season prior to the commencement of solution mining.</b>	
<b>d) A long term monitoring program for Atlantic salmon, Striped bass and Atlantic sturgeon eggs and larvae. This plan must identify operational responses to unexpected impacts to populations.</b>	
<b>e) An ongoing monitoring program of fish screens or passive water intakes to determine if impingement is occurring.</b>	
<b>2.2 The proponent must maintain a minimum of 30 meter vegetated buffer between all watercourses and wetlands.</b>	<b>Ongoing condition.</b>
<b>3.0 Archaeological &amp; Heritage Resources</b>	
<b>3.1The proponent must develop a procedure so that any issues or concerns raised by potentially affected First Nation and Aboriginal communities, particularly related to environmental effects, can be directed to the Proponent and resolved in a timely manner. This procedure must include contact information, documentation and a resolution process.</b>	Alton submitted revised plan. Accepted.  <b>Condition met.</b>
<b>3.2The proponent must develop and implement an Archaeological Contingency Plan that includes:</b>	CCH has issued the permit (A2014NS045) for the archaeological monitoring for the dyke and mixing channel areas.

	<p>Provided contingency plan in the construction EPP.</p> <p><b>Condition met.</b></p>
a) Procedures for immediate work stoppage and conservation of resources, should archaeological resources be discovered.	Contingency procedures provided in EPP- <b>condition met.</b>
b) Details of worker awareness training to be delivered to employees, which will address archaeological resources and relevant procedures.	Contingency procedures provided in EPP- <b>condition met.</b>
c) Plans for shovel testing to determine the presence of archaeological resources in the high potential areas identified.	<p>Done.</p> <p><b>Condition met.</b></p>
d) Plans to have professional archaeologist, approved by Nova Scotia Tourism, Culture & Heritage (NSTC&H), monitor any work that would impact the dykes in case any original dyke work is encountered.	<p>Unauthorised work on dyke did not have archaeologist on site. CCH sent letter Nov. 19 to company. CCH ready to issue 2015 permit.</p> <p>The A2014NS045 report is overdue.</p>
3.3 The Proponent must cease work and contact the Director, Heritage Division, Nova Scotia Department of Tourism, Culture and Heritage, the Executive Director, Confederacy of Mainland Mi'kmaq and the Executive Director, Union of Nova Scotia Indians immediately upon discovery of an archaeological site or artifact unearthed during any phase of the proposed project.	<b>Ongoing</b> condition.
4.0 Land Use & Public Involvement	
4.1 The proponent, as part of the application for Part V Approval under the Environment Act, the Proponent must provide for review and approval, a detailed of the Environmental Management Plan (EMP) including the following. Based on the results of the monitoring programs, the proponent must make necessary modifications to mitigation plans	EMP Submitted October 14, 2014; see notes on a-d below

and/or operations to prevent continued unacceptable environmental effects to the satisfaction of NSEL.	
a) An Environmental Protection Plan (EPP), that includes procedures to address soil management issues including mitigative strategies for reducing the risk of sedimentation and erosion, for all aspects of all phases of the project.	<p>Phase 1 EPP submitted May 25, 2008 – Approved under 2008-061384  Phase II EPP submitted July 16, 2008 – Approved under 2008-061384-A01  Phase III EPP submitted April 7, 2014; EPP submitted Oct 14, 2014.</p> <p><b><u>Reviewed and condition met</u></b></p>
b) A dust management plan.	<p>Oct 14, 2014 EPP page 22 Section 4.3.</p> <p><b>Reviewed and condition met</b></p>
c) A Waste Management Plan (WMP).	<p>Oct 14, 2014 EPP page 25 Section 4.6.</p> <p><b>Reviewed and condition met</b></p>
d) An Issues Resolution System including procedures to; deal with project related complaints/issues from landowners and/or the public, to ensure complaints are recorded, tracked and resolved in a timely manner.	<p>April 7, 2014 Phase III EPP page 4; Oct 14, 2014 EPP page 12 section 2.3.2.</p> <p><b>Reviewed and condition met</b></p>
4.2 The proponent must consult with Transport Canada to determine if an application under the Navigable Waters Protection Act is required and if so, obtain such approval before commencement of site preparation and construction activities.	<p>Alton has informed NSE that no TC approval required. Email dated May 28, 2014.</p> <p><b>Condition met.</b></p>
4.3 The proponent must obtain from NSDNR, any required permits for project activities pursuant to the Beaches Act and the Crown Lands Act, prior to the commencement of site preparation and construction activities.	<p>Department of Natural Resources is currently reviewing the proponent's application for the Submerged Crown Land Lease.</p> <p>Agriculture and Alton working on agreement for construction and ownership of new dykes as well as receiving approvals and zoning from local marsh body and municipality. Agriculture has requested in a letter dated Nov 5, 2014 that they repair the partial breaches in the dyke. Alton has completed the new dyke parallel to the existing</p>



	<p>dyke which lessens the impact of any failure as a result of the breach. The risk of dyke failure has lessened now that spring ice and snow melt has occurred. There is no urgency to complete repairs at this time until it is determined whether construction will resume this summer.</p> <p>A revised construction agreement is being prepared in anticipation of work at the site.</p>
<b>5.0 Flora &amp; Fauna</b>	
<b>5.1 In areas where pipeline route alterations are considered, supplemental rare plant surveys must be conducted along the new route to determine if rare plants or other sensitive habitats are present. These surveys must be provided and conducted to the satisfaction of NSDNR.</b>	<p>DNR fine with plant surveys. <b>Condition met.</b></p>
<b>5.2 The proponent must implement standard mitigative measures to minimize the environmental effects of the project on plant communities including the use of native plants and/or seed mixtures free of noxious weeds and known invasive species. The proponent must use industry standards to avoid the introduction of invasive species.</b>	<b>Ongoing</b>
<b>5.3 If the undisturbed retrorse sedge habitat becomes part of the new RoW, the proponent must cordon off the area to prevent the movement of project related equipment through the habitat.</b>	<p>DNR fine. <b>Condition met.</b></p>
<b>5.4 Clearing and grubbing must be conducted outside of the breeding season for most bird species (May 1 - August 31).</b>	<b>Ongoing</b> – condition amended to allow grubbing during this time.
<b>5.5 The proponent must not conduct project activities within 200 m of the Osprey nest identified in the field surveys during the period from April 1 to July 30.</b>	<p>DNR fine. <b>Condition met.</b></p>
<b>5.6 The proponent must conduct a</b>	Alton has provided information on what may have

<p>field survey prior to the commencement of construction activities to determine the size and location of the Great Blue Heron colony. Information from the survey must be sent to the Canadian Wildlife Service (CWS). The proponent must not allow project activities within a 400 m buffer zone of the rookeries from April through mid-August, any activities deemed to have a high disturbance factor within one-kilometer of the rookeries through the same period, or any activities requiring the removal of trees within the 400m buffer zone at any time of the year.</p>	<p>disturbed the Great Blue Heron rookery – DNR attribute this to cumulative effects in the area. Sept.15, 2014 phone conversation with DNR. <b>Condition met.</b></p>
<p>6.0 Groundwater</p>	
<p>6.1 The proponent, as part of the application for Part V approval under the Environment Act, must provide for review and approval:</p>	
<p>a) A groundwater-monitoring program including location of monitoring wells and parameters. This program must be designed to evaluate potential impacts to both groundwater levels and groundwater quality. As a minimum, one monitoring well should be up gradient and four should be down gradient of the caverns. Wells should also be constructed down gradient from the pipeline, especially in areas where the pipeline will be closest to houses. Monitoring should include quarterly water levels and quality measurements; at a minimum one-year of baseline measurements should be collected. Based on the results of the monitoring programs, the proponent must make necessary modifications to mitigation plans and/or operations to prevent continues unacceptable</p>	<p>Reviewed by NSE hydrogeologist. <b>Condition met Nov 24, 2014</b></p>

environmental effects to the satisfaction of NSEL.	
b) Details of a well survey plan of potentially at risk wells that meet NSEL standards, including water quality testing and yield determination tests.	Reviewed by NSE hydrogeologist. <b>Condition met Sept 29, 2014</b>
7.0 Contingency Planning	
7.1 The proponent, as part of the application for Part V approval under the Environment Act, must provide for review and approval:	
a) A Spill Management Plan including: measures for prevention; procedures for clean-up of any sized spill; accounting of who would be responsible for cleanup and what response and containment equipment would be available; measures for keeping birds away from a spill, and for dealing with accidents where birds are oiled and/or sensitive habitats are contaminated; reference to provincial emergency spill regulations; procedures for the storage and disposal of lubricants, petroleum products and waste oils; and reference to provincial regulations pertaining to this storage and disposal, and number and location of on site-personnel spill kits.	An Emergency Response and Contingency Plan (dated May 7, 2015) and a letter dated May 7th, 2015 was submitted to NSE on May 11, 2015. The information was reviewed and was determined to be incomplete. An email was sent to the proponent requesting the missing information. Additional information was submitted on May 21, 2015 and has been determined to be complete. <b>Condition met.</b>
b) An Emergency Response and Contingency Plan consistent in format and content with NSEL's Contingency Planning Guidelines, including:	The Emergency Response and Contingency Plan was submitted May 11, 2015 – <b>condition met</b>
i) safety features incorporated in project design,	As above
ii) post accidental monitoring,	As above
iii) system shut down procedures,	As above

iv) notification procedures,	As above
v) containment, decontamination and remediation standards to be met in clean-up,	As above
vi) training and exercise drills including Workplace Hazardous Materials Information System (WHMIS) training,	As above
vii) comprehensive inspection and maintenance procedures, regulatory compliance standards, reference to CSA Standard Z341 and the CAN/CSA Standard Z731-03 Emergency Preparedness and Response Standard, and	As above
viii) procedures to address tourism operations on the Shubenacadie river, Cobequid and Minas Basins.	Email Dec 19, 2014 TCH. <b>Condition met.</b>
c) Details of the Environmental, Health and Safety (EHS) system.	Information submitted May 11, 2015 - <b>condition met.</b>
d) Details for the assessment of other water uses or withdrawals, in or near the project area that could be affected by project related accidents.	Information submitted May 11, 2015 – <b>condition met.</b>
7.2 All monitoring programs must be resubmitted over the lifetime of the project, at a schedule established by NSEL, and revised as determined by NSEL.	Ongoing

## Environmental Assessment Approval

Approval Date: *Original Dated* May 21, 2013

### Alton Natural Gas Pipeline Project

Alton Natural Gas Storage LP, Proponent  
Colchester County, Nova Scotia

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**2015 Follow-up  
December 4, 2015**

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The Alton Natural Gas Pipeline Project (the "Undertaking"), proposed by Alton Natural Gas Storage LP (the "Approval Holder") near Alton, Colchester County, Nova Scotia is approved pursuant to Section 40 of the *Environment Act* and Section 18(a) of the *Environmental Assessment Regulations*. This Approval is subject to the following conditions and obtaining all other necessary approvals, permits or authorizations required by municipal, provincial and federal acts, regulations and by-laws before commencing work on the Undertaking. It is the responsibility of the Approval Holder to ensure that all such approvals, permits or authorizations are obtained before commencing work on the Undertaking.

This Environmental Assessment Approval is based upon the review of the conceptual design, environmental baseline information, impact predictions, and mitigation presented in the Registration Document and Focus Report.

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#### Terms and Conditions for Environmental Assessment Approval

1.0 General Approval	Status/Comments
1.1 The Environmental Assessment Approval for the Undertaking is limited to the Undertaking as described in the Environmental Assessment Registration Document and Focus Report.	Ongoing.
1.2 Expansion, modification or relocation of any aspect of the Undertaking from that proposed in the registration information must be submitted to the Environmental Assessment Branch for review and may require an environmental	<b>Ongoing</b>  Following a review of the Alton Natural Gas Pipeline Project Proposed Re-Alignment (January 7, 2015), it has been determined that no further environmental assessment (EA) is required, with the proviso that an archaeological impact assessment, as well as physical assessments for wetlands and watercourses are completed for the new alignment.

assessment (EA).	<p>Alton conducted fieldwork in the summer 2015:</p> <ul style="list-style-type: none"> <li>• Archaeological impact study <ul style="list-style-type: none"> <li>○ 2 days (outstanding)</li> </ul> </li> </ul>
<p>1.3 The Approval Holder must, within two years of the date of issuance of this Approval, commence work on the Undertaking unless granted a written extension by the Minister.</p>	<p>Work has not yet begun on the pipeline.</p> <p><b>Extension granted to May 21, 2017</b></p> <p>“commence work” means, with respect to an undertaking, to begin construction or site preparation activity for an undertaking or any part of an undertaking;</p>
<p>1.4 The Approval Holder must not transfer, sell, lease, assign or otherwise dispose of this Approval without the written consent of the Minister. The sale of a controlling interest of a business or a transfer of an approval from a parent company to a subsidiary or an affiliate is deemed to be a transfer requiring consent.</p>	<p>A transfer has previously occurred in December 2013. During this transfer, all of the equity interests of Veresen Energy Infrastructure in both the limited partner and the general partner was acquired by AltaGas Natural Gas Storage Ltd.</p> <p>This condition is <b>on-going</b></p>
<p>1.5 The Approval Holder must implement all mitigation and commitments in the Registration Document and Focus Report, unless approved otherwise by Nova Scotia Environment (NSE).</p>	<p><b>Ongoing</b></p>
<p>1.6 The Approval Holder must provide a report to NSE's Environmental Assessment Branch one year following construction of the Undertaking. The report must include, but not be limited to, site development, mitigation plans, monitoring results, and compliance with the Terms and Conditions of the EA Approval.</p>	<p>One year after construction.</p>
<p><b>2.0 Project Location and Route Selection</b></p>	<p><b>Ongoing.</b></p>

2.1 Approval is based on the "Original Alignment" of the pipeline as described in the EA Registration Document and Focus Report.	
<b>3.0 Project Infrastructure and Activities</b> 3.1 Prior to clearing and/or construction, the Approval Holder must submit the Environmental Management Plan (EMP) for review by Department of Fisheries and Oceans (DFO) and review and approval by NSE.	<b>Ongoing.</b>
3.2 The Approval Holder must update and revise the EMP at the request of NSE, at any time during construction or operation of the Undertaking.	<b>Ongoing.</b>
3.3 All revisions to the EMP must be forwarded to NSE for review and approval.	<b>Ongoing.</b>
3.4 The Approval Holder must, in consultation with NSE and Fisheries and Oceans Canada, develop a post construction monitoring and reporting schedule to be included in the EMP.	<b>Ongoing.</b>
3.5 The Approval Holder must distribute the EMP and all subsequent revisions to NSE and other regulatory agencies.	<b>Ongoing.</b>
<b>4.0 Proposed Wilderness Areas Lands</b> 4.1 Within four years of the date of this EA Approval, the Approval Holder must develop and implement a compensation plan that has been reviewed and approved by NSE, for impacts on the Stewiacke River	To date, there have been only very preliminary discussions between the proponent and NSE regarding the compensation plan.

Wilderness Area. This plan shall include, but may not be limited to, the securement of conservation land in the vicinity of the Undertaking for statutory protection by the province.	
4.2 Prior to any clearing and /or construction in a proposed wilderness area the Approval Holder must provide notification to NSE.	No clearing or construction in a proposed wilderness area has commenced as of yet.
4.3 The Approval Holder must ensure that any work within a designated wilderness area is approved by the Minister of Environment as required by the <i>Wilderness Areas Protection Act</i> .	No work within a designated wilderness area has commenced as of yet.
<b>5.0 Aquatic Habitat/ Surface Water/ Watercourse Crossings</b> 5.1 The Approval Holder must not undertake any "wet" watercourse crossing, unless otherwise approved by NSE.	Ongoing.
5.2 The Approval Holder must obtain an approval from NSE for the construction of watercourse crossings, as specified in the <i>Activities Designation Regulations</i> .	Five watercourses will need to be crossed for the pipeline.  A watercourse alteration approval was issued June 6, 2014 for crossings along the water pipeline.
5.3 Any environmental impacts on the public water supply for the Town of Stewiacke must be corrected by the Approval Holder to the satisfaction of NSE.	Ongoing.
5.4 Prior to clearing and/or construction, the Approval Holder must provide an approved security that is satisfactory to NSE. This security is to cover an alternate temporary and/or permanent	Josh Blakeney working on this. NSE waiting for help from Bruce Langille with security for gas pipeline in Protected Water Area.



drinking water supply in the event that the Undertaking impacts the public water supply.	
<p><b>6.0 Groundwater</b></p> <p>6.1 Prior to any blasting, the Approval Holder must conduct a pre-blast survey for water wells within 800 m of the point of blast. The survey must be conducted in accordance with the NSE "Procedure for Conducting a Pre-Blast Survey". Any water well impacts from the blasting must be corrected by the Approval Holder to the satisfaction of NSE.</p>	The pre-blast survey has not yet been received by NSE.
<p><b>7.0 Flora and Fauna</b></p> <p>7.1 Prior to clearing and/or construction, the Approval Holder must provide DNR's Regional Services and Wildlife Division staff with digital way point files revealing precise locations for all "RED", "YELLOW" and "UNDETERMINED" listed species based on actual field inventories for rare/endangered vascular, non-vascular plants, lichen, birds, mammals, and reptiles within the affected corridor. The Approval Holder must report to NSE that the files have been provided to DNR. Final location of the pipeline must be determined in consultation with DNR's Wildlife Division, pending review of inventory results.</p>	DNR's Regional Services and Wildlife Division staff have not yet received the digital way point files
7.2 Site preparations that include deforestation, clearing and grubbing must be undertaken between September 1 <sup>st</sup> and March 30 <sup>th</sup> in order to minimize impacts on breeding birds that may include endangered and threatened species listed under the <i>Species</i>	Ongoing.

at Risk Act and/or the Nova Scotia Endangered Species Act, unless otherwise approved by NSE.	
7.3 If site preparation activities occur between mid-July and August 31 <sup>st</sup> , the Approval Holder must prepare and implement a monitoring and mitigation plan for breeding activity (i.e. nesting) pursuant to the <i>Migratory Bird Convention Act</i> , in consultation with DNR and the Canadian Wildlife Service.	Further details will be included in the project EPP.  Ongoing.
7.4 The Approval Holder must use natural species to re-vegetate exposed soil in forest and riparian zones.	Not applicable at this time.
7.5 The Approval Holder must contact DNR prior to any site investigations, construction, or project related access planned on Crown lands.	DNR received an application for a Crown Land Easement on September 5, 2014. This application is currently under review.  There have been some changes to the Crown land in the area. As a result of a purchase of lands by the Province from Northern Pulp in 2010, nearly 3900 hectares of former Northern Pulp land in the St. Andrews River area became provincial Crown land. This land was included among the areas put forward for public review in 2011 as lands being considered for protection.  Subsequently, a portion of this area was proposed not to be protected in favour of a nearby area currently privately owned (Our Parks and Protected Areas – A Plan for Nova Scotia, Province of Nova Scotia, 2013). Protection of this substitute area depends on provincial acquisition of the land, possibly through a trade. Whether this occurs or not, and whether all or only a portion of the area currently planned for protection is ultimately protected, there will have been a net increase of 3900 ha of Crown land in this area since 2009.
7.6 Prior to construction, the Approval Holder must undertake wood turtle nesting surveys and all nesting areas must be avoided. All wood turtles found or observed must be reported immediately to DNR's Wildlife Division and the Regional Biologist.	DNR staff have not yet been provided with information as to whether wood turtle nesting surveys have been conducted

<p><b>8.0 Wetlands</b>  8.1 The Approval Holder must obtain an approval from NSE for the wetland alterations, as specified in the Activities Designation Regulations.</p>	<p>The approval holder has not yet obtained approvals for wetland alterations.</p>
<p>8.2 The Approval Holder must provide GPS boundary coordinates and shape files of all wetlands delineated for the Undertaking to NSE.</p>	<p>The approval holder has not yet provided GPS boundary coordinates for delineated wetlands.</p>
<p><b>9.0 Air Quality and Noise</b>  9.1 The Approval Holder must participate in future air shed management programs as required by NSE.</p>	<p>NSE has not required the approval holder participate in programs regarding air shed management.</p>
<p>9.2 The Approval Holder must not burn any materials generated as a result of construction activities.</p>	<p>No construction waste has been generated yet and that this condition will be ongoing.</p>
<p>9.3 The Approval Holder must conduct air quality monitoring or dust monitoring at the request of NSE.</p>	<p>NSE has not requested the approval holder conduct air quality or dust monitoring.</p>
<p><b>10.0 Public Consultation</b>  10.1 The Approval Holder must form, at the request of NSE, a Community Liaison Committee (CLC) for both the Alton Natural Gas Storage Facility and this Undertaking, in consultation with NSE and with municipal and community representatives. The NSE <i>Guidelines for the Formation of a Community Liaison Committee</i> shall be used for the guidance of the Approval Holder and community.</p>	<p>NSE has not yet required the approval holder to form a CLC.</p>
<p>10.2 The Approval Holder must provide, for review and approval by NSE, procedures for hearing and responding to community concerns raised during the construction and operation of the Undertaking.</p>	<p>NSE does not yet have this document.</p>

<p><b>11.0 Nova Scotia Mi'kmaq</b>  11.1 The Approval Holder must develop and implement a Mi'kmaq Communication Plan for the Undertaking, which will include a process for communicating project details and seeking input from the Mi'kmaq community.</p>	<p>This plan has been created.</p> <p>Condition met.</p>
<p>11.2 The Approval Holder must solicit CLC membership from the Mi'kmaq community if a CLC is requested to be formed by NSE.</p>	<p>NSE has not yet required the formation of a CLC.</p>
<p><b>12.0 Archaeological and Heritage Resources</b>  12.1 The Approval Holder must submit reports for archaeological resource impact assessments conducted for this Undertaking, to Nova Scotia Department of Communities, Culture and Heritage for review and approval. Based on the conclusions and recommendations of this review, further studies and/or mitigation may be required at the request of NSE.</p>	
<p>12.2 The Approval Holder must cease work and contact the Special Places Coordinator, Nova Scotia Department of Communities, Culture and Heritage immediately upon discovery of an archaeological site or artifact unearthed during any phase of the proposed Undertaking. If the find is of certain or suspected Mi'kmaq origin, the Approval Holder must also contact the Executive Director of the KMKNO.</p>	<p>Ongoing.</p>
<p><b>13.0 Contingency Planning</b>  13.1 Prior to clearing and/or construction the Approval Holder must submit the Emergency Response and Contingency Plan to NSE for review and approval.</p>	<p>The approval holder has not yet submitted the Emergency Response and Contingency Plan to NSE</p>

13.2 The Approval Holder must contact NSE immediately upon discovery of any contaminated soil.	Ongoing.
<b>14.0 Decommissioning and Site Reclamation</b> 14.1 The Approval Holder must provide NSE with a finalized abandonment plan, for review and approval, six months prior to the permanent shut down of the Undertaking.	Ongoing.

# Alton Approval Status

## Alton Natural Gas Storage Project

Updated October 8, 2015

Department	Type of Approval/Permit/Advice	Status
Nova Scotia Environment	Environmental Assessment Approval – Alton Natural Gas Storage Project	Approved December 18, 2007
	Temporary Watercourse Alteration Approval	Approved April 3, 2008 Approval # 2008-061382
	Approval to Construct and Operate Brine Storage Pond (Phase 1)	Approved April 3, 2008 Approval # 2008-061384
	Approval to Construct & Operate Brine Storage Pond and Associated Works Phase II: site preparation and well-drilling	Approved June 12, 2008 Approval # 2008-061384A01
	Watercourse Alteration Approval to Construct – Pipe Culvert	Approved June 10, 2009 Approval # 2008-062749
	Environmental Assessment Approval – Alton Natural Gas Pipeline Project	Approved May 21, 2013 Not planned for the near future
	Water Course Alteration Approval – Temporary Crossings	Application submitted March 2014. Approved May 1, 2014 Approval # 2014-088795
	Watercourse Alteration Approval for Waterpipeline Crossing	Approved June 6, 2014 Approval # 2014-089061
	Amendment to Industrial Approval Application Phase III - Construction of Freshwater/Brine Storage Pond .	Application submitted April 2014  Approved August 8, 2014 Approval # 2008-061384-A02 Approval is only for the construction of the brine storage pond.
	Amendment to the Industrial Approval for the Brine Storage Pond will be required for the operation of the brine pond (to allow brine water to be released into the Shubenacadie River)	NSE received an application from the company seeking an Industrial Approval to begin operating the brine storage ponds (October 14, 2014) and it is under review. This will be essentially an Approval to Operate and it will not be issued until the requirements of all agencies involved have been met.

Office of Aboriginal Affairs	Procedure for communication with the Mi'kmaq of Nova Scotia. Consultation with the Assembly of Nova Scotia Mi'kmaq Chiefs and separate Consultation with Sipekne'katik First Nation.	<p>Alton submitted a draft First Nations Engagement Strategy to NSE on October 5, 2014 and a revised First Nations Engagement Strategy to OAA on October 23, 2014. OAA advised NSE the Strategy is acceptable on December 12, 2014. Upon request, the Strategy was shared with the Assembly on December 8, 2014.</p> <p>Consultation on outstanding permits and authorizations is continuing with the Mi'kmaq.</p>
Communities Culture and Heritage (CCH)	To review archaeological reports.	<p>CCH received the requested archaeological reports and reviewed them. The permitted archaeologist was notified in writing (June 26<sup>th</sup> 2014) that revisions are required for report A2011NS33. CCH is still waiting for the requested revisions necessary for CCH approval and sign off on archaeology recommendations.</p> <p>CCH has issued the permit (A2014NS045) for the archaeological monitoring for the dyke and mixing channel areas.</p> <p>Early Jan. 2015 CCH received application for new arch. permit.</p> <p>Oct.2015 received application for permit for alternate route.</p>
Department of Natural Resources	<p>Lease of submerged Crown land.</p> <p>Easement required for gas pipeline.</p>	<p>Lease template sent to Alton. May 19, 2015 Alton submitted the Crown Land Lease Application to DNR.</p> <p>Easement application June 11, 2014</p>

Department of Agriculture	Providing a variance for construction on the incorporated Fort Ellis Marsh required under the Agricultural Marshland Conservation Act and entering into an agreement to construct on Crown Land as the Dyke is owned by NSDA.	<p>A letter was sent to Alton Gas on November 3, 2014, from the Minister of Agriculture, indicating that the agreement will not be signed until meaningful Crown consultation with the Mi'kmaq proceeds and other necessary approvals (DNR authority for coastal lands) are in place. The letter also required the company to repair the breached dyke located on Crown Marshlands. The repair agreement was signed on January 20, 2015. The repair work was not completed this winter pending further consultation with the Mi'kmaq.</p> <p>Alton has completed the new dyke parallel to the existing dyke which lessens the impact of any failure as a result of the breach. The risk of dyke failure has lessened now that spring ice and snow melt has occurred. There is no urgency to complete repairs at this time until it is determined whether construction will resume this summer.</p> <p>A revised construction agreement is being prepared in anticipation of work at the site.</p>
Fisheries Canada	DFO to provide advice.	On Aug 1, 2014 DFO reviewed Alton Estuary Monitoring Plan. Recommend a study be completed to determine median toxicity threshold of the brine water on egg, larvae and juvenile Stripped bass survival. This study can be completed prior to operation or during. Changes to the toxicity study are currently under review.
Department of Energy	Hydrocarbon Storage Area Lease.	On June 2, 2009 this lease was granted.
Nova Scotia	Approval for construction of	On September 4, 2013 approval



Utility and Review Board	storage caverns.	issued for construction of storage cavern.
Various	Permits for natural gas surface facilities and pipeline will require additional permits.	Not yet applied for these permits.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

98

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

Action Date:

February 01, 2016

To:

MacNeil, Jack

Document Date:

February 01, 2016

From:

MacPhail, Helen

Description:

**From:** MacPhail, Helen [mailto:Helen.MacPhail@novascotia.ca]

**Sent:** 2016-February-01 1:30 PM

**To:** Dera, Beata E; Weseloh McKeane, Sean; Skinner, Bradley; Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Brenton, Jay; Maass, Oliver C; Blakeney, Josh G; Jacobi, Carol; McLean, Mark G; Bird, Michael W; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; Jollymore, Mary Anna T; Huston, Justin E; Labor, Peter  
**Cc:** Wright, Patricia E; Sanford, Steve L  
**Subject:** Alton

Hello All,

I have received the following updates:

DNR is finalizing the terms of the lease with Alton/their legal counsel; the latest draft is with them for their review. To avoid any delay resulting from finalizing the terms of the lease, DNR has issued an interim letter of authority (LOA) for Alton to start preparatory work on the submerged Crown lands (on the side of the river as it is now/pre channel). The LOA was sent to Alton on Friday; they have to countersign the LOA and return it to DNR for it to be in effect.

The Agriculture agreement has been signed by Alton and Agriculture Minister (Jan.28)

CCH issued the archaeological permit (number A2016NS008) for monitoring work on the dyke on January 28th.

We have decided to cancel this week's meeting but proceed with the meeting on February 17 at which time we will discuss permitting of the pipeline. We ask that you come prepared to speak to the protected areas requirements and DNR's authorizations and timelines, as well as all other permits. Having a clear sense of these will help determine our next steps for Aboriginal consultation.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Details of the February 17 meeting will be sent closer to the date.

Regards,

*Helen MacPhail*

Environmental Assessment Supervisor  
**Environmental Assessment Branch**  
Nova Scotia Environment  
1903 Barrington Street  
Suite 2085  
PO Box 442  
Halifax, NS B3J 2P8  
Tel 424-3960  
Fax: 424-6925

Action:	Information Received	Effective Date: Expiry Date - HADD/Serious Harm: Expiry Date - Other : Compensation/Offsetting: Included in List of Records: Species at Risk:
Time Spent (Hrs): Authorization Rationale:	0.00	

Warning: Information in PATH may be private and/or sensitive and should not be shared without appropriate consultation and/or permission. Refer to the Data and System Security section of the PATH Helpfiles for details

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182  
Receive Date: 2006/08/11

101

Activity: Correspondence - Do not go to Macro Access Screen  
To: MacNeil, Jack  
From: MacPhail, Helen  
Action ID No.: 101  
Action Date: April 06, 2016  
Document Date:

**From:** MacPhail, Helen [mailto:Helen.MacPhail@novascotia.ca]  
**Sent:** 2016-April-06 3:56 PM  
**To:** Dera, Beata E; Weseloh McKeane, Sean; Skinner, Bradley; Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Brenton, Jay; Maass, Oliver C; McLean, Mark G; Bird, Michael W; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; Jollymore, Mary Anna T; Huston, Justin E; Labor, Peter  
**Cc:** Wright, Patricia E; Sanford, Steve L  
**Subject:** Information from DFO

Mark McLean provided this update: DFO gave a presentation to the Striped Bass Fishing Association a few weeks back, attached is the presentation and the response to a series of follow up questions provided.

Action: Information Received  
Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:  
Time Spent (Hrs):  
Authorization Rationale:

0.00

Title: PATH File No:	Shubenacadie River - water withdrawal and effluent release and natural gas storage 06-HMAR-MA7-00182	Habitat File No: 06-W7-182	Receive Date: 2006/08/11
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Directory:

File Name:

Document Type (Upload):

DFO Response to Striped Bass Assoc Questions

Other

File Extension:

File Size:

pdf

269,066

Directory:

File Name:

Document Type (Upload):

Presentation to the Striped Bass Assoc Feb 2016

Other

File Extension:

File Size:

ppt

534,528

**DFO's Response (in blue) to question from the Striped Bass Association  
March 2016**

**24-day Shutdown**

1. With respect to the 24 day brine pumping shutdown period that will start when eggs are first noticed in the waterway:

a. What monitoring method(s) will be used, where in the river, and how often is monitoring being conducted (daily? weekly?) to identify when eggs are in the water column?

Below is the information from the Alton Gas Monitoring Program which forms part of the Nova Scotia Industrial Approval. In addition to the monitoring required under the Nova Scotia Industrial Approval noted below, Dalhousie University will likely continue their monitoring program which will also be used to help inform the proponent of the start of the spawning event.

**Striped bass spawning site monitoring**

- Water temperature will be monitored continuously at the Alton river site during operations and when the spring time mean daily temperature reaches 11°C then degree days will be calculated as an additional indicator of potential Striped bass spawning events.
- When the mean daily water temperature is above 11°C, the Striped bass spawning site will be monitored daily as described below.
- Weather forecasts will be closely monitored in anticipation of warming temperatures leading to spawning events.
- Gaspereau fishers congregating at the 'Fish Shack' (local fishing community hub, Main St West, Stewiacke) will be consulted at least twice weekly. Through their handling of striped bass by-catch and word-of-mouth, they know the state of sexual maturation of the striped bass.
- Striped bass spawning locations from the hwy 102 to the CN Bridge on the Stewiacke River will be visually monitored for indication of spawning events.

**Alton river site monitoring – Plankton sampling, to determine Striped Bass egg and larvae presence:**

- Day time flood tide (30 second long) plankton net sampling in the main river channel at the river site will be conducted every 10 minutes on the 90 minute flood-tide. Sampling frequency, when the mean daily water temperatures reach 11°C, sampling will be daily on the daytime flood tide seven days a week until live Bass eggs are detected.
- When eggs are detected at the Alton site on the flood tide sampling, brine discharge will be stopped and Nova Scotia Environment will be notified.

**Water intake:**

- Pump tests sampling for all the species, numbers, life stage and mortalities based on the cubic meters of water sampled.
- Samples will be taken at the intake face, and in the intake well inside of the gabion face.

b. Will there be ongoing monitoring throughout the spawning period? How often and at what locations?

There is no requirement for regular monitoring during shutdown. The advice from DFO was to minimize the sampling during shutdown to reduce the number of Striped Bass eggs impacted by sampling programs not required for the project operation. Additional monitoring by Dalhousie University for research and conservation purposes may continue during the shutdown period.

c. Will there be monitoring after the spawning period and/or 24 day shutdown? How often will this monitoring be done and in what locations?

As noted above, monitoring at the intake will include sampling three times a week when withdrawing water starting the first Monday in May through to July 15, then once a week through to September 30<sup>th</sup>.

d. Is this 24-day shutdown for the first year only or for all years? (The approval apparently states for the first year only).

The shutdown would apply to any year the project is in operation. Adjustments to the shutdown period could be made by Nova Scotia Environment in future years if the proponent is able to better define the timing of the peak spawning period to DFO's satisfaction.

e. What are the technical aspects of the shutdown? That is, how is it accomplished and what are the ramifications to the river and aquatic life during shutdown and startup phases?

Our understanding is the shutdown can happen immediately (i.e., there is no need to conduct a slow reduction of the intake), however DFO is not aware of the mechanics of how shutdown is undertaken. It is understood that river water would continue to flow through the constructed channel and will drain back and forth through the gabion wall but there would be no pumping from the intake or discharge from the diffuser in the mixing channel. Start-up would see the operation withdraw and discharge at the rates as seen under normal operations. It is not expected that aquatic life would be impacted either during shut down or start up with the application of the mitigation measures required under the Nova Scotia Environment Industrial Approval.

f. Will there be shutdowns, or consideration of shutdown, when other fish are spawning in the area? How would this process be enacted?

There are no fish other than Striped Bass likely to spawn in the area of the project; however the intake will be sampled for any aquatic life three times a week when withdrawing water starting the first Monday in May through to July 15, then once a week through to September 30<sup>th</sup>. Any mortality associated with the intake is to be reported to Nova Scotia Environment and DFO. If unacceptable mortality is observed, additional mitigation measures may be applied including further shutdown periods.

### **The Intake and Gabion Wall**

2. What type and how often is monitoring to be done in the 'monitoring well' inside the gabion wall?

The intake will be sampled for any aquatic life three times a week when withdrawing water starting the first Monday in May through to July 15, then once a week through to September 30<sup>th</sup>.

3. In the approval and Environmental Assessment (EA) and Industrial Approval (IA) it states that there will be minimal forces on animals around the intake because the intake is gravity fed. Is the intake only gravity fed i.e. is the pumping to the salt caverns governed by water seeping through the gabion walls only, or is there pumping involved as well? To put it another way: How can it not be pumped given the flow rates required for salt mining?

The project requires 10,000 cubic metres per day or 0.12 cubic metres (120 litres) per second. The intake surface area of the gabion wall ranges from 244 square metres to 52 square metres depending on the tidal level and river flows. This large surface will allow enough water to gravity feed through the wall to provide the needed volumes for the intake pipe. The use of gravity flow will maintain the low intake velocities at the wall face to minimize any entrainment or impingement of fish. (see response to question 14 for more details)

4. Is there any monitoring of movement rates of water through the gabion wall proposed? Who will conduct this monitoring?

The proponent will measure velocities at the intake face during low flow, mid-flood tide, slack tide, and mid-ebb tide along transects along the face to obtain a picture of the current patterns during intake. Additionally DFO will conduct monitoring at the site during operations and measurements will be taken if site conditions warrant further investigations.

5. Who will conduct the monitoring at the gabion wall well and in the river?

Regular monitoring will be done by the proponent but additional monitoring will be conducted by Nova Scotia Environment and DFO staff.

6. Will there be any agency oversight on monitoring? As well, will DFO or Environment Canada be doing any independent monitoring?

Nova Scotia Environment and DFO will be conducting monitoring at the site to verify the operation is compliant with their Approval and other relevant Acts and Regulations.

### **Monitoring in General**

7. Many have the sentiment that there needs to be real-time monitoring and as quick as possible results posted for all to see. With this in mind:



a. How many days between monitoring and when the details of monitoring are available to agencies?

Salinity monitoring at the site includes real-time monitoring. As per the Nova Scotia Industrial Approval, monthly reports are to be submitted to Nova Scotia Environment for the first four months and then quarterly after the first four months. Any request for monitoring information should be made to Nova Scotia Environment.

b. Will the monitoring data/information be available to the public?

Any request for monitoring information should be made to Nova Scotia Environment.

8. There is mention of monitoring of physical and chemical aspects of the waterway using a conductivity-depth-temperature (CDT) profiling device or other such devices. When is this monitoring being undertaken? That is, what is the schedule? We have heard it is only during ice-free months and there is little indication in the monitoring plan of timing. Is this true?

Real-time monitoring of salinity levels are done at 5 metres either side of the outfall diffuser (i.e., these devices are wired to shore-based controls) and will monitoring year-round. Additional CDT data loggers will be placed on the bottom at both ends of the channel and will record every 10 minutes. Data will be downloaded daily during the first week of start-up and then following the ramp up period, data will be downloaded weekly. Ice conditions may prevent data retrieval from the CDT in the channel but those at 5 metres from the diffuser will continue to be monitoring and these are the compliance points for the salinity levels.

9. Will there be monitoring of the entire ecosystem? That is, not just for striped bass eggs and larvae, but for other fish eggs, larvae, and invertebrates?

Additional monitoring to be done includes:

- Starting in spring 2015 and continuing for one year, water samples will be collected monthly at high and low tide at the Alton site on the Shubenacadie River estuary. Samples will be tested for standard water analysis, and total metals. This testing will allow for baseline data to capture the natural water quality conditions in the river. Sampling may not be completed in months when the river is ice-covered.
- When the Alton Natural Gas project is withdrawing Shubenacadie River water and brining the salt caverns, water samples will be collected from the water tank at the cavern site (river water that the sediment has settled out of and has gone through the filters), the brine pond at the outlet end and the Shubenacadie River at low and high tide. All four samples will be tested for standard water analysis, total and available metals, and petroleum hydrocarbons. These samples will be collected monthly for the first four months, then will move to quarterly sampling. Additional samples may be requested by the Government based on this data.

- Brine in the brine pond will be tested for natural occurring radioactive materials (NORMs) before caverns are 25% developed. Based on that sample, additional sampling may be required.
- Atlantic salmon smolt acoustic tagging will be conducted to see if they use the channel – in the spring of the first year of operation.
- Striped bass acoustic tagging will be conducted to see if they use the channel – in the first year of operation.
- Vemco receivers: one will be located in the center of the new channel and one on each side of the river up-estuary of the channel.
- The intake will be sampled for any aquatic life three times a week when withdrawing water starting the first Monday in May through to July 15, then once a week through to September 30<sup>th</sup>.

10. Will there be any monitoring of eggs that settle to the bottom?

There are no plans to monitor eggs that settle to the bottom. It is not anticipated that the project will have any impact on egg settling.

11. Will there be any monitoring of the benthic environment (bottom sampling, etc.)?

There are no plans to monitor the benthic environment unless indications warrant additional sampling.

12. Is the 'Water Act' being taken into consideration with regards to monitoring and brine pumping?

The Water Act is Nova Scotia legislation, therefore this question is best directed to Nova Scotia Environment.

13. Has pumping of brine as outlined in Alton Gas's plans, or anything similar, ever been done before i.e. pumping of brine into a tidal estuary or river or estuary?

DFO is not aware of any similar projects. The conditions of the river and the species that use it make this situation unique; therefore careful analysis was done to ensure potential impacts at this site were understood before providing advice to Nova Scotia Environment.

14. In what cases does DFO have authority to shut down the brining process? What is the response time period between an offense and action? How is a complaint registered? How is an action initiated?

DFO's regulatory mandate includes Section 35 of the Fisheries Act: 35. *(1) No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery.* Serious harm to fish includes impacts to fish habitat and/or the death of fish from means other than fishing or the deposit of a

deleterious substance. If this project activities results in the unacceptable death of fish from water withdrawal activities, DFO can take enforcement action which could include the shutting down of water withdrawal activities until the issue is addressed through other mitigation measures. If a complaint is received regarding the death of fish, DFO gives these issues a high priority due to the need for timely investigations. Complaints can be registered through the Environmental Emergencies number at 1-800-565-1633. This number is staffed 24 hours a day, 7 days a week and complaints are routed to staff on call. The proponent is also required under the Fisheries Act to notify DFO of any activities that result in serious harm to fish.

Complaints or incidents related to brine release can be made to the same number and would be routed to Environment Canada's Enforcement Branch as they have the mandate to address issues under Section 36(3) of the Fisheries Act: *Subject to subsection (4), no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.*

15. Will monitoring be conducted for eggs and larvae and fishes over the winter i.e. the months were ice is formed in the river? What methods will be used at this time?

There would normally be no eggs or larvae in that area of the river in the winter months. Given the monitoring and mitigation measures (e.g., maintain salinity levels within the natural range and low intake velocities), there are unlikely to be any impacts to fish. As such there was no requirement to monitor for egg, larvae or fish during the winter months.

#### **Fish and Invertebrate Questions**

16. Where do scientists (government, etc.) get their information to make recommendations such as those by COSEWIC?

If the question is asking how species are assessed as endangered, etc., the COSEWIC assessment process can be found at: [http://www.cosewic.gc.ca/eng/sct0/index\\_e.cfm](http://www.cosewic.gc.ca/eng/sct0/index_e.cfm). Information on the listing of species under Species at Risk Act can be found at: <http://www.dfo-mpo.gc.ca/species-especes/index-eng.htm>.

17. Is there any information, or was any information sought, for the effects on gaspereau, eels, shad, or other fish species or invertebrates from the near-field salinity effects or the effects of the intake face (gabion wall)?

DFO reviewed the risk assessment prepared by the proponent. This risk assessment examined all possible fish species that could be found in the system

and reported on the life stages likely to be present and the known salinity tolerances for each species and life stage based on published literature. As salinity levels will be maintained within naturally occurring background levels (0ppt to 28ppt) at 5 metres from the outfall and that all species found in the system are presently exposed to significant changes in salinity, it is not likely that the release of brine will have an impact on any of the fish species found in the project area.

Intake velocities in the openings in the rock face were calculated to range from a maximum of 0.0012 m/sec (1.2 mm per second) at high tide to a maximum of 0.0056 m/sec (5.6mm per second) at low tide if there is continuous withdrawal of 10,000 cubic meters/day, representing the maximum possible withdrawal rate. DFO's Freshwater Intake End of Pipe Fish Screen Guidelines set out intake velocities and screen designs to minimize impingement of fish, specifically the guidelines state: *Envelope curves for approach velocities were developed for each swimming mode corresponding to a minimum fork length of 25 mm and a maximum endurance time of 10 minutes (the time the fish is in front of the face of the screen before it can elude it). To satisfy approach velocities of approximately 0.11 m/s and 0.038 m/s for the subcarangiform (fish such as gaspereau and shad) and anguilliform groups (eels) respectively, curves indicating the required open screen areas, based on fish swimming performance data, including fish species and size (Katopodis, 1990) and related to flows/extractions, were developed.*

The maximum velocity predicted at the site is 0.0056 m/sec and the escape velocity for eels (the lower of the two) is 0.038 m/sec. Therefore the calculate intake rate is 6.78 times less than the DFO guidelines for fish screening.

18. There appears to be differences in the two theses (Gina (Stewart) McInnis and Craig Reesor) with respect to monitoring outcomes. How was this rectified by DFO and Alton Gas to come to conclusions on monitoring protocols?

DFO Science used the data collected by Dalhousie University and DFO to identify the critical spawning period independently of these papers. The review of the monitoring plan used this information, together with other species' life histories for the area to evaluate the effectiveness of the proposed monitoring and mitigation plans.

19. Does DFO know how many striped bass are in the Shubenacadie system or that migrate up/down the river system? If they do not, then how can anyone monitor a mortality event or estimate mortality at all?

The latest published data comes from the 2014 Recovery Potential Assessment document for Striped Bass found at [http://www.dfo-mpo.gc.ca/csas-sccs/publications/sar-as/2014/2014\\_053-eng.pdf](http://www.dfo-mpo.gc.ca/csas-sccs/publications/sar-as/2014/2014_053-eng.pdf). The report includes the following information: *Spawner abundance was estimated in 2002, when the abundance of Age 3+ years and older fish was estimated at 15,000, including 7,000 that were Age 4+ years and older. This estimate is considered a*

*conservative minimum estimate because only Striped Bass descending in the spring from Shubenacadie-Grand Lake, Nova Scotia, a known freshwater over-wintering site, were included in the census. Reported bycatch in commercial Shad and Gaspereau fisheries occurring in the Shubenacadie River indicates that Shubenacadie River Striped Bass spawner abundance may have increased since 2002. Available data indicate that even though juveniles have been produced annually since 1999, higher spawner abundance has not resulted in increased recruitment in the Shubenacadie River.*

It is understood that research by Dalhousie University will continue to monitoring Striped Bass spawning activity in the river and will report this information to regulators as necessary.

20. If there are issues in the river, such as increased mortality or a decrease in striped bass population, then how will DFO untangle who or what is at fault? How will cause and effect be determined?

Annual recruitment within the Striped Bass population is highly variable due to weather conditions during and after spawning, therefore detecting any change in the population as a result of any activity is challenging. Rather than rely on changes in the population, DFO has recommended that mitigation and monitoring focus on the potential pathways of effects. Toxicity testing on eggs and larvae, combined with real-time monitoring of salinity levels and the 24 day shutdown period is designed to minimize any potential impacts on Striped Bass from exposure to brine. The intake design, together with the 24 day shutdown period will minimize any potential impacts on Striped Bass from entrainment or impingement at the intake structure. Monitoring at both these location will better determine any potential direct effects from these pathways which can then be addressed before any population level impacts are realized.

### **General Questions**

21. In all of the statements and pamphlets by Alton Gas, it is stated that the amount of salt being released will be incredibly small compared with the salt in the river during a tidal cycle. If this is the case, then why did DFO/Environment Canada recommend more monitoring and studies?

Although true that the amount of brine to be release is relatively small compared to the water moving past the site, there is still a change in the environment at the location Striped Bass eggs and larvae (a sensitive stage for a species assessed as endangered (COSEWIC 2012)) would be found. The salinity levels will be within naturally occurring background levels within 5 metres from either side of the outfall; however that potentially leaves a 10 metre section of the mixing channel with salinity levels above background. Adult fish will avoid areas of salinity they are not able to tolerate, however Striped Bass eggs and larvae are free floating and therefore can not avoid this area. As eggs and larvae may enter the mixing channel, DFO recommended the toxicity study to determine salinity tolerances and the 24 day shutdown period to avoid the peak spawning (95% of spawning

occurs within the first 24 days). Additional monitoring was recommended to confirm the mitigation measures are effective. This is standard for most projects.

22. Design testing i.e. build it, then test it, makes people uneasy. As well, technology controlling the shutdown and other aspects is not without issues. What failsafety measures are in place for technological control? How are failsafety measures going to be tested?

Question on engineering design are best directed to Nova Scotia Environment.

23. Quarterly reviews for monitoring and monitoring outcomes (results of monitoring) are too lengthy. Is this the proposed review policy? Has there been consideration of this lengthy time lapse between monitoring and action? What is the confirmation process when monitoring reveals something is wrong?

Questions related to monitoring reporting should be made to Nova Scotia Environment

24. There is a letter in the IA by Mark McLean 'approving' this project. Please explain the reasoning.

In the Industrial Approval under the section Reference Documents, it refers to a Letter from DFO to Alton Gas regarding the review of the Estuary Monitoring Plan. The monitoring plan was submitted to DFO for review to address condition 2.1 of the Nova Scotia Environmental Assessment conditions (December 18, 2007). DFO reviewed the plan and provided the additional recommendation for toxicity testing for Striped Bass eggs and larvae. The letter was not an approval of the project as DFO does not have any approvals or authorizations to issue for the activity as it was determined that the project would not result in serious harm to fish, as defined in the Fisheries Act, as long as the proposed mitigation measures were put in place.

25. Section 35 of the Fisheries Act has provisions for altering habitat etc. How does DFO sanction Alton Gas with respect to the Fisheries Act?

As noted earlier, section 35 of the Fisheries Act states, *No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery.* Serious harm to fish includes impacts to fish habitat and/or the death of fish other than from fishing or the deposit of a deleterious substance. The only change in the habitat is the addition of the mixing channel, which does not alter or destroy existing habitat. As noted above, the design of the intake structure mitigates the entrainment and impingement (which could cause death) of fish and the shutdown period avoids the entrainment of eggs and larvae.

26. Has there been any work done on salt 'build up' in sediments in this river system? Were there any concerns raised over salt build up in any of the discussions with DFO?

As the salinity will reach naturally occurring background levels within 5 metres of the outfall, salinity levels in the river will remain within their natural range. Presently salinity levels in the project location range from 28 parts per thousand (ppt) to 0 ppt with no accumulation of salt in the area.

### **Brine Holding Pond Questions**

27. What is the pond for?

The pond allows the proponent to control the release of brine into the river to maintain salinity levels required in the Nova Scotia Environment Industrial Approval. There may be additional purposes for the pond but these would be questions for the proponent.

28. How long does it take to flush out the ponds?


This question should be directed to the proponent or Nova Scotia Environment.

29. What are the precautions and actions to be taken when storm water breaches the ponds?

The pond will be isolated from the river by the new dyke. Therefore any overflow from the pond would not reach the river directly. If there was a release from the pond, there could be a slow seep of water into the river which would likely be diluted to background levels within a small area.

30. Is the pond brine reflective of the river water


The mixing pond would have salinities at a maximum of 260 parts per thousand (ppt), the river water ranges from 0ppt to 28ppt. There will be less sediment in the pond water than the river water as these are removed prior to brining. The temperature should be close to the ambient temperature in the area. These are the only anticipated changes to the water through the brining process.

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## Fisheries and Oceans Canada Review of the Alton Gas Storage Project

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### Overview

- Fisheries Protection Program
- Regulatory Context
- Advice Provided
- Science Review
- Next Steps

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## DFO's Fisheries Protection Program

### ***What we do***

The Fisheries Protection Program works collaboratively with others to help address risks to commercial, recreational and Aboriginal fisheries related to habitat degradation or loss, flow alteration and aquatic invasive species.

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## DFO's Fisheries Protection Program

### ***We are responsible for:***

- direct administration of the fisheries protection provisions of the *Fisheries Act* including the establishment of guidelines and regulations.
- administration of certain provisions of the *Species at Risk Act*, and specific legislative responsibilities in relation to federal environmental assessment regimes.
- meeting the duty to consult, and where appropriate, accommodate in relation to authorizations and its potential impacts on Aboriginal and Treaty rights.

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## Fisheries Protection Provisions of the *Fisheries Act*

- **Section 35:** *"No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery."*
- DFO's policy interpretation of serious harm to fish:
  - the death of fish
  - a permanent alteration to fish habitat of a spatial scale, duration and intensity that limits or diminishes the ability of fish to use such habitats
  - the destruction of fish habitat of a spatial scale, duration, and intensity that fish can no longer rely upon such habitats

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## Pollution Prevention Provisions of the *Fisheries Act*

- **Environment and Climate Change Canada** administers section 36 of the Fisheries Act
- This is the key pollution prevention provision, prohibiting the deposit of deleterious substances into waters frequented by fish, unless authorized.
- A deleterious substance can be any substance that, if added to any water, would degrade or alter its quality such that it could be harmful to fish, fish habitat or the use of fish by people.

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## Nova Scotia Environment Act

- The *Environment Act* lays out the framework that companies, individuals, and governments must follow in order to help manage and protect Nova Scotia's environment.
- The **Activities Designation Regulations** and the **Environmental Assessment Regulations** identify in detail the types of activities that require environmental approvals.

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## Review Process

- 2007 – Provincial EA Process – Comments provided by DFO including a DFO Science review
- 2007 - Additional Information Required for EA
- 2014 - Aboriginal Consultation Process established by Nova Scotia
- 2014-15 DFO reviews monitoring program from Alton Gas with advice to Nova Scotia
- 2015 – DFO Science review of peak Striped Bass spawning
- 2016 – Nova Scotia issues the Industrial Approval

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## Focus of DFO's Review

- Impingement or entrainment of fish (including eggs, larvae, juveniles and adults) at the intake.
- Changes in water chemistry (focused on changes in salinity but also other chemical components)
- Changes in sediment

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## Impingement/Entrainment of Fish

- 24 Day shut down during Striped Bass spawning (only species likely to have eggs in the project area)
- Project design:
  - *Intake velocities in the openings in the rock face range from a maximum of 0.0012 m/sec (1.2 mm per second) at high tide to a maximum of 0.0056 m/sec (5.6mm per second) at low tide if there is continuous withdrawal of 10,000 cubic meters/day, representing the maximum possible withdrawal rate. DFO intake rates for subcarangiform swimmers, such as trout and salmon, for which the approach velocity should be 0.11 m/s (0.36 ft/s) or less, and for anguilliform swimmers, such as eels, 0.038 m/s (0.12 ft/s (DFO intake screening guidelines 1995)*
- Ongoing monitoring of intake structures and further shutdown if required.

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## Changes in Water Chemistry

- **Salinity Limits:**
- Salinity data will be recorded every minute at five meters either side of the brine discharge. If average salinity over a 10 minute period is 7ppt above background or above 28ppt, the discharge flow will be reduced by 20% by the computer system. The discharge flow will continue to be reduced by 20% every 10 minutes until the average salinity is within 7ppt of background and at or below 28ppt
- From the date that Stripped bass eggs are detected the brine discharge will be stopped for 24 days. From start-up following the no brine release period until July 5<sup>th</sup>, the discharge will be regulated as above to maintain salinities at or below 7ppt above background and at or below 20ppt.

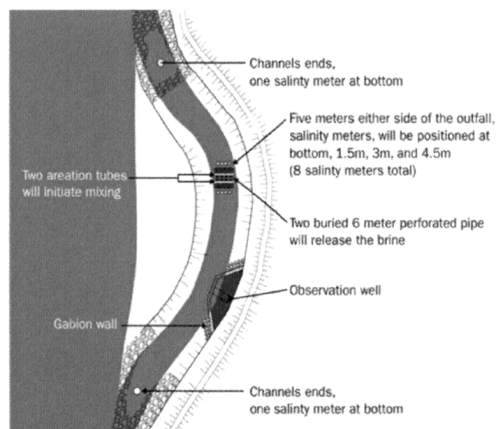
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## Changes in Water Chemistry



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## Changes in Water Chemistry

- Conductivity Depth Temperature (CDT) data logger will be placed on the bottom of the river 100 meters downstream of the constructed channel recording each 10 minutes and downloaded bi-weekly during the ice free months
- Toxicity testing on the bass eggs and larvae will be conducted using the protocol approved by DFO to be used to establish exposure limits for Striped Bass eggs and larvae

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## Changes in Sediment

- Sediment removed from river water before entering caverns
- No increase in sediment above 25mg/l permitted under NS Environment Approval

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## Science Review - Striped Bass Spawning

- "Presence of eggs (onset of annual spawning activity) in the river as a trigger to cease the release of brine has potential as a means to eliminate the risk of exposure of eggs to brine during the period of principle annual spawning activity"
- "The proposal to monitor daily water temperatures at the brine release site, beginning 1 May, can help to identify the potential onset of spawning activity and to begin preparations for reducing/ceasing the release of brine"
- "Data indicates a time period up to 24 days would protect 95% of eggs produced. Thus, the risk of exposure of eggs to brine would be greatly reduced if brining activities were to cease for 24 days" following first detection of eggs.

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## Science Review - Striped Bass Spawning

Year	Days required to Achieve P (Annual Egg Production)							
	0.01	0.25	0.5	0.75	0.8	0.9	0.95	0.99
2008	7	7	12	12	12	12	17	17
2009	6	6	7	15	15	16	16	26
2010	10	11	11	18	18	19	19	35
2011	4	11	12	16	16	23	23	24
2012	4	5	5	11	11	15	17	23
2013	1	17	17	17	24	24	24	28
2014	1	1	3	13	13	13	16	35
2015	1	3	4	4	4	13	16	19
Mean	4.3	7.6	8.9	13.3	14.1	16.9	18.5	26.1
StDev	3.3	5.2	4.9	4.5	5.8	4.6	3.3	6.7

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## Science Review - Striped Bass Spawning

- Monitoring for eggs in the main channel as well as the intake structure will trigger the shutdown period
- *"The brevity of the non-feeding (yolk-sac) stage when larvae are most sensitive to salinities in excess of 20 ppt, and their apparent rapid dispersal throughout the estuary, suggests that overall risk to this life history stage would be low when brine releases are managed as to minimize risk to eggs" during principle spawning activity.*

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## Next Steps

If operations begin, DFO will:

- Review monitoring data from Nova Scotia Environment
- Review the results of the toxicity study
- Review ongoing Striped Bass monitoring programs conducted by Dalhousie University
- Provide advice to Nova Scotia Environment on the effectiveness of mitigation measures

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## Occurrences

Any issues noted with the operation of the facility  
should be reported to the Environmental Emergencies  
phone number:

**1-800-565-1633**

Thank you

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Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

Activity:

Correspondence - Do not go to Macro Access Screen  
MacNeil, Jack  
MacPhail, Helen  
Action ID No.: 100  
Action Date: April 06, 2016  
Document Date:

To:

From:

Description:

-----Original Message-----

From: MacPhail, Helen [mailto:Helen.MacPhail@novascotia.ca]

Sent: 2016-April-06 3:51 PM

To: Dera, Beata E; Weseloh McKeane, Sean; Skinner, Bradley; Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Brenton, Jay; Maass, Oliver C; McLean, Mark G; Bird, Michael W; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; Jollymore, Mary Anna T; Huston, Justin E; Labor, Peter  
Cc: Wright, Patricia E; Sanford, Steve L  
Subject: FW: Letter from AltaGas Ltd re: Alton Natural Gas Storage Project

FYI

-----Original Message-----

From: Brenton, Jay

Sent: Wednesday, April 06, 2016 8:35 AM

To: Blakeney, Josh G <Josh.Blakeney@novascotia.ca>; Jollymore, Mary Anna T <MaryAnna.Jollymore@novascotia.ca>; Maass, Oliver C <Oliver.Maass@novascotia.ca>; MacKinnon, David S <David.MacKinnon2@novascotia.ca>; MacPhail, Helen <Helen.MacPhail@novascotia.ca>; Sanford, Steve L <Steve.Sanford@novascotia.ca>; Skinner, Bradley <Bradley.Skinner@novascotia.ca>; Blair, David <David.Blair@novascotia.ca>; McNally, Kelly D <Kelly.McNally@novascotia.ca>  
Subject: FW: Letter from AltaGas Ltd re: Alton Natural Gas Storage Project

FYI. Alton will not be commencing any active construction until the Summer to enable more discussion with Mi'kmaq communities.

Jay

-----Original Message-----

From: Huston, Justin E

Sent: April 5, 2016 5:14 PM

To: Dera, Beata E <Beata.Dera@novascotia.ca>; Miller, David J <David.J.Miller@novascotia.ca>; Brenton, Jay <Jay.Brenton@novascotia.ca>; MacPhail, Helen <Helen.MacPhail@novascotia.ca>; Skinner, Bradley <Bradley.Skinner@novascotia.ca>; Weseloh McKeane, Sean <Sean.WeselohMcKeane@novascotia.ca>; Cameron, Melanie J <Melanie.Cameron@novascotia.ca>; Hines, Samantha E <Samantha.Hines@novascotia.ca>; Bekkers, Kevin

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

s.19(1)  
F <Kevin.Bekkers@novascotia.ca>  
Cc: Potter, Heather L <Heather.Potter@novascotia.ca>  
Subject: FW: Letter from AltaGas Ltd re: Alton Natural Gas Storage Project

FYI

-----Original Message-----

From: Tim Church  
Sent: Tuesday, April 05, 2016 5:10 PM  
To: Huston, Justin E <Justin.Huston@novascotia.ca>  
Cc: Coolican, Murray <Murray.Coolican@novascotia.ca>; Towers, Julie K <Julie.Towers@novascotia.ca>  
Subject: Letter from AltaGas Ltd re: Alton Natural Gas Storage Project

Justin - I hope this note finds you well. We have sent the attached letter to various Mi'kmaq leaders indicating that we are taking a break on active construction until summer to allow more community discussions; and to outline various areas where we could work together on monitoring and benefits. The letter has already apparently been posted to Facebook, so you may get some inquiries on the same.

Best regards,

Tim

Action:

Information Received

Effective Date:  
Expiry Date - HADD/Serious Harm:  
Expiry Date - Other :  
Compensation/Offsetting:  
Included in List of Records:  
Species at Risk:

Time Spent (Hrs):  
Authorization Rationale:

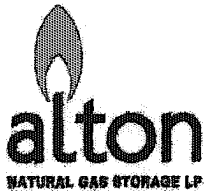
0.00

Directory:

File Name:  
Document Type (Upload):

img-404171241-0001  
Other

File Extension: pdf  
File Size: 645,637



Alton Natural Gas Storage LP.  
87 Main Street, 2<sup>nd</sup> Floor  
Stewiacke, NS B0N 2J0

April 4, 2016

Chief Bob Gloade  
Millbrook First Nation

Chief Rufus Copage  
Sipekne'katik First Nation

District Chief R. Knockwood  
Grand Council

Dear Honourable representatives:

**Re: Long Term Relationship between the Mi'kmaq of Nova Scotia & Alton Natural Gas Storage**

Thank-you for allowing Alton Natural Gas Ltd. to meet with members of the Mi'kmaq community on March 22 at Millbrook First Nation. As you are aware, AltaGas Ltd. wishes to resume construction of the Alton Natural Gas Storage Project (Alton), within the Traditional Territory of the Mi'kmaq of Nova Scotia.

I am writing today to confirm that the company is receptive to a pause of active civil construction until this summer to provide an opportunity for additional discussions with the Mi'kmaq community. The company is taking this step based-on feedback from the community.

While this pause in civil construction continues through to summer, the company will only undertake routine maintenance and minor upgrades of its facilities. We will seek to engage with communities and we will be publically communicating about the project, including advertising (job fairs, etc) and providing additional dialogue.

During this period, Alton welcomes the opportunity to build upon a mutually respectful relationship that supports traditional title and rights, protects the environment, and offers benefits and participation by your community. We welcome the opportunity to meet with interested members of the community at regular intervals. This could include: small group meetings to discuss issues and answer questions, group facility tours, and progressing discussions around Mi'kmaq benefits.

Our company is committed to working in good faith with you to develop a long-term relationship and would like to propose a few approaches which are briefly attached for your consideration (Attachment 1). There may well be other areas you would like to discuss that could better meet the needs of your community. We would ask members of the community who are willing to engage with Alton, to please advise the company by April 13 so we can agree to a path forward by contacting myself, or:

Tim Church, VP, Stakeholder Relations: [REDACTED]

Rob Turner, Manager, Stakeholder Relations: [REDACTED]

Page 2  
April 4, 2016

We look forward to working with you, now, and in the future.

Sincerely,  
**Alton Natural Gas Storage LP**



David Harris  
President and Chief Operating Officer

cc:

Chief Terry Paul, Chief Sidney Peters & Chief PJ Prosper, Assembly of NS Mi'kmaq Chiefs  
Chief Grace Conrad, Native Council of Nova Scotia

Page 3  
April 4, 2016

**Attachment 1:**

**Areas of possible joint collaboration**

**Joint Monitoring**

The environment is a priority in all projects we are involved in. We adhere to the highest environmental standards and we are committed to addressing apprehensions the communities may have by way of inclusion in our activities. Alton is proposing to support and engage the Mi'kmaq of Nova Scotia in ongoing environmental effects monitoring during brining operations to assist with mitigation and avoidance of impacts on traditional Mi'kmaq rights. Alton does not intend to initiate civil construction at the river or brining operations until after Striped Bass peak spawning this summer, so we have time to discuss the extent of the monitoring activities.

Alton proposes a meaningful opportunity for your community to play a critical role in the monitoring of potential project impacts on the Shubenacadie and Stewiacke River Systems. Alton is committed to conducting environmentally safe operations on any lands that we have access to and having both technical and traditional environmental knowledge would be beneficial for all parties. It is a shared responsibility.

In the short term, this could include:

- Mi'kmaq environmental monitors during construction: The company wishes to engage Mi'maq environmental monitors to be present during construction activities at the river site. We will have an archaeologist present during certain activities; the addition of Mi'kmaq monitors would help ensure that traditional treaty rights are observed and respected.
- Mi'kmaq involvement in reviewing the natural gas pipeline route: The company would welcome the opportunity for Mi'kmaq participants to join us to review our proposed pipeline route, this would include walking the proposed pipeline route (approx. 12Km).

**Community Benefits**

Alton is committed to fostering immediate and enduring community benefits with the Mi'kmaq of Nova Scotia. Potential benefits could include employment during construction and operations. Alton is also interested in providing training opportunities to help qualify workers. We are prepared to discuss the specific numbers and types of employment opportunities with you and your community.

**Social/Community Partnerships**

Alton would like to partner with the Mi'kmaq community to provide funding support for social and community development priorities, as well as support for economic development opportunities. We welcome the opportunity to support Elders, children and women's priorities, youth sport, scholarships or other identified community priorities. This will require a focused discussion with the leadership and community to ensure priorities are properly identified.



Page 4  
April 4, 2016

Alton is also interested in the potential for partnerships or joint ventures with Mi'kmaq businesses. In other jurisdictions, AltaGas Ltd. has partnered on a range of projects and has provided funding to support micro-financing to Indigenous entrepreneurs and regarding renewable energy.

#### **Next Steps**

Alton is ready and willing to work towards the development of a relationship agreement to memorialize our commitments to the community and environment. In order to facilitate and maintain an effective on-going working relationship, Alton would like to suggest a joint committee to oversee and administer the implementation and intent of a relationship agreement. The committee could serve as the primary liaison and be responsible for providing advice and information with respect to the agreement. This committee can also discuss ways to enhance and improve relationships between the Mi'kmaq, industry and government.

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

99

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:

Action Date:

April 06, 2016

To:

MacNeil, Jack

Document Date:

From:

MacPhail, Helen

Description:

**From:** MacPhail, Helen [mailto:Helen.MacPhail@novascotia.ca]

**Sent:** 2016-April-06 3:48 PM

**To:** Dera, Beata E; Weseloh McKeane, Sean; Skinner, Bradley; Hines, Samantha E; Cameron, Melanie J; Bekkers, Kevin F; Brenton, Jay; Maass, Oliver C; McLean, Mark G; Bird, Michael W; 'MT.Grant@ec.gc.ca'; Robichaud, Loretta L; Devine, Lisa J; Crouse, Lee Ann G; Geddes, Peter; Walker, Ernest; MacKinnon, David S; MacNeil, Jack; Potter, Heather L; Nikoloyuk, Jordan; Jollymore, Mary Anna T; Huston, Justin E; Labor, Peter

**Cc:** Wright, Patricia E; Sanford, Steve L

**Subject:** Alton Gas Update

Hello All,

Just a quick update:

Alton will not be commencing any active construction until the Summer to enable more discussion with Mi'kmaq communities (I'll forward an email).

DFO gave a presentation to the Striped Bass Fishing Association a few weeks back (I'll forward the presentation and the response to a series of follow up questions).

Today NSE met with Alton to discuss compensation requirements for the proposed Stewiacke River Wilderness Area. The next meeting will include DNR and OAA.

Alton indicated they would soon be going into the field to carryout archaeological survey work for the proposed re-alignment of the gas pipeline.

We are supposed to meet next week, but I will be out of the office from Friday, April 8 for 2 to 3 weeks. If folks want a meeting then perhaps someone can volunteer to chair it.



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Receive Date: 2006/08/11

Thanks  
Helen

Action:	Information Received	Effective Date:
		Expiry Date - HADD/Serious Harm:
		Expiry Date - Other :
		Compensation/Offsetting:
		Included in List of Records:
		Species at Risk:

Time Spent (Hrs): 0.00

Authorization Rationale:

Title: Shubenacadie River - water withdrawal and effluent release and natural gas storage  
PATH File No: 06-HMAR-MA7-00182  
Habitat File No: 06-W7-182

Receive Date: 2006/08/11

102  
January 04, 2019

Activity:

To

From:

Note to File

McLean, Mark

MacNeil, Jack

Description:

Assessor has been changed from: MacNeil, Jack To McLean, Mark

Action:

Q Lead Assessor Changed {x}

Action ID No.:

Action Date:

Document Date:

Effective Date:

Expiry Date - HADD/Serious Harm:

Expiry Date - Other :

Compensation/Offsetting:

Included in List of Records:

Species at Risk:

Time Spent (Hrs):

0.00

Authorization Rationale: